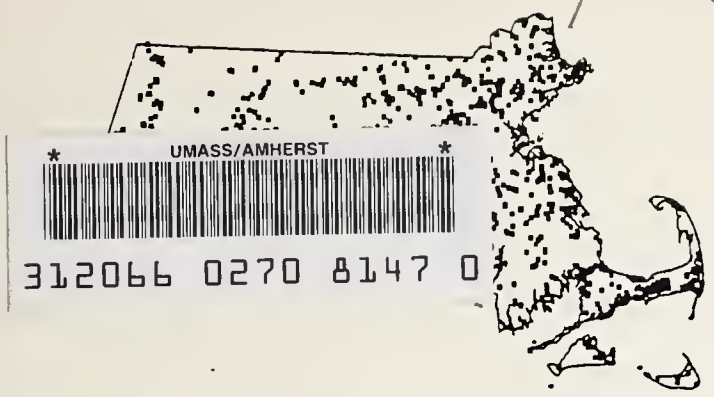
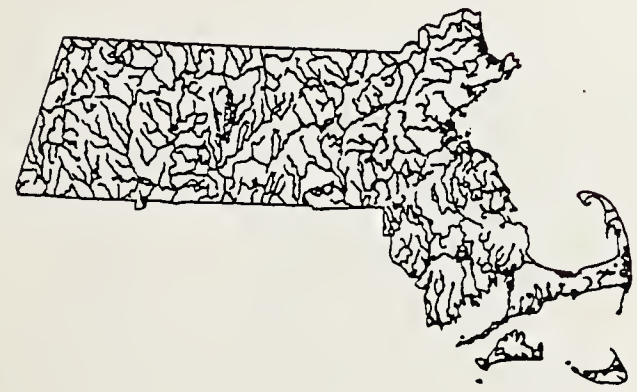
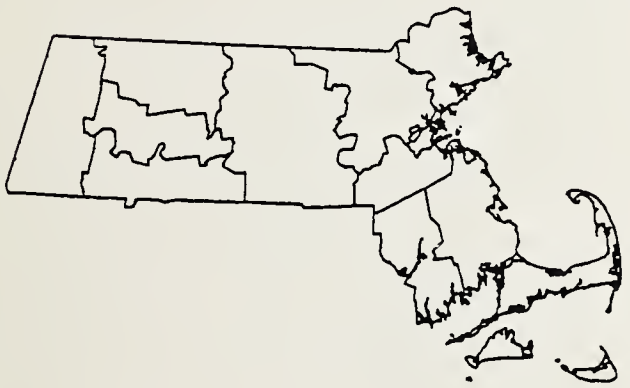
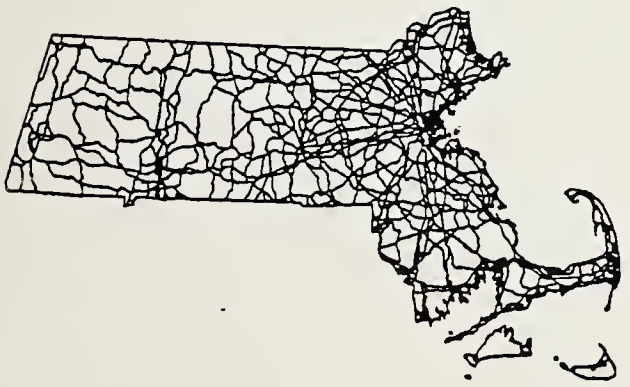


MassGIS DATALAYER DESCRIPTIONS and GUIDE TO USER SERVICES







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MassGIS DATALAYER DESCRIPTIONS and GUIDE TO USER SERVICES

April 1993

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INTRODUCTION

What is GIS? What is MassGIS?

A geographic information system (GIS) is a computer system capable of assembling, storing, manipulating, and displaying "geographically referenced information,"--that is, data identified according to its spatial location. Geographic information systems belong to a family of spatial analysis software that includes computer-aided design and drafting (CADD) and automated mapping and facilities management (AM/FM). GIS is distinguished from these by its capacity to perform complicated analytical functions that often include combining information from different sources to derive meaningful relationships.

The evolution of geographic information systems in the Commonwealth of Massachusetts is not unlike its development in other states. A lead agency, in this case the Executive Office of Environmental Affairs (EOEA), perceived an opportunity to meet its goals through a statewide GIS. Three related feasibility studies were funded, a plan for development was negotiated with its sub-agencies, and that plan was implemented over a five year period. As a result EOEA has become the major provider of digital geographic information within the Commonwealth and maintains a lead position among all Massachusetts public agencies using geographic information technology.

EOEA is a cabinet level office responsible for the coordination of five environmental and natural resource departments:

- the Department of Environmental Protection (DEP);
- the Department of Environmental Management (DEM);
- the Department of Food and Agriculture (DFA);
- the Department of Fisheries, Wildlife, and Environmental Law Enforcement (DFWELE); and
- the Metropolitan District Commission (MDC).

It also has a statutory responsibility to act as a clearinghouse for environmental data and to provide data processing services to its agencies.

The geographic information system developed by EOEA is MassGIS, which now has close to sixty users with direct access to the system software and as many as twenty projects in progress at any given time. MassGIS is located within the Environmental Data Center, where a staff of four operates ARC/Info GIS software on VAX and Sun computer systems, maintains a color electrostatic plotter, engages in spatial data analysis and development, and supports the GIS users in EOEA's constituent departments. Through MassGIS, the Commonwealth has created a coordinated, statewide database of spatial information for environmental planning and management. MassGIS distributes data from this database to the public.

How to use this guide

This catalog describes each of the categories of data ("datalayers") available from EOEA's geographic database, as well as other cartographic products and services offered by MassGIS. The Summary Chart in Section 3 offers a quick overview of the data and its pertinent characteristics, including a short description of data contents, paneling scheme and source scale. For each datalayer, Section 4 provides a detailed description of data sources, scale, production techniques, and database attributes are provided. To facilitate ordering these data, illustrations of datalayer paneling schemes and tables of standard MassGIS coding for the panels are located in Section 6. In addition, services provided to the user

community by MassGIS are outlined in Section 2.4. The Terms and Conditions which apply to the use of MassGIS data and services can be found in Section 5. Also provided in Section 5 are an order form and instructions to simplify requests for data or map products.

Services offered by MassGIS

MassGIS offers three types of services to outside agencies and members of the public:

- **Distribution** of digital GIS data from the EOEA database
- **Map production**, printing, and custom design services
- **Cooperation** in GIS analysis and data development of mutual interest

In the Budget Control and Reform Act of 1989 (Ch.658, §138), the Massachusetts Legislature authorized a schedule of fees to be charged by EOEA for the digital cartographic data and services it provides. Each product is placed in a price category according to the complexity of the data or service. The charges are intended to recover the costs of labor, materials, and computer processing time expended in fulfilling requests.

As noted earlier, EOEA has become the major provider of digital geographic information within the Commonwealth of Massachusetts. **Data distribution** is the primary service offered to the public by MassGIS. Each datalayer is divided into one or more geographic 'tiles' or 'coverages'; the cost of distribution per file is listed with each datalayer description. The standard format for digital data distributed by MassGIS is ARC/Info Export, with data in the Massachusetts State Plane coordinate system (Mainland zone). This format is useable by other GIS installations operating the Arc/Info GIS software produced by the Environmental Systems Research Institute. MassGIS can convert its data into formats used by many other GIS and CADD software packages--including DXF (AutoCAD), DLG, MapInfo and ASCII--or project its data into over thirty other coordinate systems. Although complete attribute transfer is not always possible, this conversion capability makes MassGIS data accessible to most widely used desktop mapping systems. There is an additional $25.00 fee per file for this conversion service.

Map production, printing, and custom design services include the production of maps from the EOEA geographic database and the use of the color electrostatic plotter maintained by MassGIS. MassGIS does not have maps on hand available for distribution, so all maps are prepared individually and printed upon demand. However, MassGIS has prepared a number of map "Themes" to facilitate distribution of frequently requested GIS data in the form of maps. (See Section 5 for descriptions of these themes.) The 1989 Budget Control Reform Act specifies three categories of map production services based on the estimated time to process various types of map requests:

- **Category A:** This includes *MassGIS Theme maps* of towns, quadrangles, or other standard units; and *copies of other maps* already produced by MassGIS or EOEA agencies (while still available on the EOEA computer system).
  Cost: $50.00 for the first sheet, $25.00 thereafter

- **Category B:** This includes *MassGIS Theme maps* of client-specified study areas; and *minor modifications* of maps already produced by MassGIS or EOEA agencies.
  Cost: $100.00 for the first sheet; $25.00 thereafter

- **Category C:** This includes creation of *new maps or map themes* from EOEA geographic data based on clients' specifications.
  Cost: $150.00 for the first sheet; $25.00 thereafter

All MassGIS maps are printed in color on 46" x 33" sheets of paper. For maps printed on

mylar, add $15.00 per sheet. MassGIS can also print *Arc/Info or Calcomp plot files* supplied by clients on computer tape; the cost for this service is $50.00 for the first sheet, $25.00 for additional copies of the same plot file, or $25.00 each for orders of more than 25 plot files.

Cooperation in GIS analysis and data development of mutual interest may also be available from MassGIS. MassGIS charges for GIS analysis services under the terms of the 1989 Budget Reform and Control Act, which, based on the time and resource requirements of projects, specifies four fee categories: $250.00, $500.00, $1,000.00, and $2,500.00. Because data collection for GIS is very costly, EOEA encourages cooperation and communication among agencies and organizations involved in the development and application of GIS data. EOEA's arrangements for joint development of new data of mutual interest include grants and data exchange agreements.

Where to turn for more information

The U.S. Geological Survey publishes a color poster entitled "Geographic Information Systems" which provides a good overview of GIS concepts and capabilities. Copies can be obtained at USGS Earth Science Information Centers or by calling 1-800-USA-MAPS.

The Massachusetts Office of Technology Planning has addressed GIS projects in Massachusetts state and town governments, including MassGIS, in the January 1990 and March 1993 issues of its newsletter *Information Technology Monthly* (formerly *MIS*). Contact the newsletter staff at One Ashburton Place, Room 1601, Boston, MA 02108.

Municipalities considering investing in their own GIS software may wish to seek out past issues of *Planning* magazine, published by the American Planning Association. The July 1992 issue of *Planning* reviews many of the desktop GIS packages for which MassGIS can provide data. Several bulletins published recently by the Metland Research Team at the University of Massachusetts, Amherst, also address this topic; contact the Department of Landscape Architecture and Regional Planning at Hills North, Amherst, MA 01003.

The Massachusetts Geographic Information Council (MGIC, pronounced "magic") provides a forum for communication and cooperation among state agencies, authorities, regional planning agencies, universities, towns, and businesses that are developing GIS information and systems within Massachusetts. Participation in MGIC is open to all; the council meets monthly in Boston. For more information about MGIC, contact the Office of Technology Planning at (617) 973-0720.

MASSGIS DATABASE UPDATES

One of the most important functions of the MassGIS staff is to keep the database up-to-date and growing. Spatial data changes and new data sources become available over time. The following describes some new additions to the database, recent changes to environmental datalayers, and some initiatives to produce new digital data.

New Datalayers

Enhanced Hydrography: MassGIS has completed a statewide 1:25,000 hydrography layer. The USGS 100,000 DLG hydrography data has been enhanced for approximately 40% of the USGS Grid quadrangles. In addition, nearly half of the quadrangles in Massachusetts are now available as 1:24,000/1:25,000 DLG hydrography. The remainder, consisting of the islands of Martha's Vineyard and Nantucket, were digitized by MassGIS. As part of an ongoing effort to have a true 1:25,000 statewide hydrography datalayer, the enhanced 1:100,000 hydrography quadrangles will be replaced by scanned, vectorized and coded USGS 1:25,000 blue color separates.

DEP Permitted Solid Waste Facilities: DEP Division of Solid Waste Management (DSM) has compiled the majority of sanitary landfills permitted or registered with DEP as of January 1991. Other features in datalayer include transfer stations and recycling or composting facilities. The landfills in this datalayer are those permitted since 1971.

Datalayer Changes

Areas of Critical Environmental Concern (ACECs): The Department of Environmental Management (DEM) and Coastal Zone Management (CZM) have expanded the coverage to include 22 ACECs. The newest ACEC is the Herring River Watershed.

Drainage Subbasins: The Department of Environmental Protection (DEP) Division of Water Supply (DWS) added the state boundary and 1:100,000 coastline to this coverage. Previously subbasin boundaries ended at the state boundaries as open polygons. Additionally, drainage basins were delineated from the intake points of public water supplies. Based on Massachusetts Surface Water Quality Standards of 1990, these basins were further coded if they were designated as containing Outstanding Resource Waters (ORW). A groundwater divide has also been added for Cape Cod.

Community Public Water Supplies: DEP DWS has completed its compilation of community water supplies based on the Water Supply Protection Atlas maintained by DWS Technical Services. 1435 groundwater and surface water sources are now in this datalayer. The attributes have been expanded to include several TYPEs of source as well as yield (GPM).

Open Space: MassGIS is currently updating its state and federal lands datalayer with additions of municipal, nonprofit, and private conservation and recreational lands and facilities. This datalayer will be fully integrated with EOEA's 1993 Statewide Comprehensive Outdoor Recreation Plan when completed.

Surficial Geology: The U.S. Geological Survey has delineated floodplains, lake bottom deposits and fines to further enhance the 1:250,000 surficial geology. Thickness ranges have also been added for sand and gravel deposits. MassGIS has added these data to the original surficial geology and repanelled the datalayer by county.

1990 Census Datalayers: In cooperation with the Central Transportation Planning Staff,

MassGIS has reprocessed its 1990 Census block and block group coverages using the U.S. Census Bureau's final post-census TIGER files and available statistical data. Coverages are now available for Barnstable, Bristol, Essex, Middlesex, Norfolk, Plymouth, Suffolk, and Worcester counties; the processing of the remaining counties is underway.

New Data Initiatives

Statewide Digital Orthophotography: EOEA has awarded a multi-year blanket contract to produce digital orthophoto quadrangles. The results of this project will include black and white digital images for use within GIS, a digital terrain model, and a 1:5,000 scale hardcopy base map. State agencies and localities will be eligible to use this contract. Outside of the densest communities in Massachusetts, the 1:5,000 scale images will serve as a useful base map for compiling parcel boundaries and wetlands interpreted from 1:12,000 color infrared photos, conducting preliminary screenings of site suitability, and other environmental analyses.

1991 Land Use: Some funding has been identified by the Massachusetts Highway Deaprtment and Massachusetts Water Resources Authority to update the 1985 land use for Greater Boston's metropolitan region. The aerial photography flyover was completed in the spring of 1992; UMASS will need to be contracted for the photo interpretation and digitization. Currently, Cape Cod has been completed for 1990 land use with funding coming from the Cape Cod Commission. Further funding needs to be identified in order to complete this project for the remainder of the state.

MASSGIS DATA TABLE
Summary Chart

Unless otherwise noted, all data in Mass State Plane Projection.
PAT files refers to Polygon (Area) Attribute Table unless otherwise noted. AAT refers to Arc (Line) Attribute Table.

Data Layer & Status	Organi-zation	Source Data and Automation Type	Source Scale	Data Accuracy	Tile Unit Cost/ Tile	Data Extent	Data Format & Feature Type	Additional Comments
Topographic Quadrangle Template 1:25,000	MassGIS	Generated from lat/long corners of USGS quadrangles	1:25,000	Precisely defined	State $50	State	Arc/Info PAT file	Exists also as TIC registration points
Digital Quadrangle Template	MassGIS	Generated from 7.5 minute grid and edited to coincide with extent of USGS digital quadrangles	NA	Precisely defined	State $50	State	Arc/Info PAT file	The 1:25,000 Hydrography and Coastline corresponds to this panelling scheme
MassachusettsState Plane Grid & Points	MassGIS	Generated from Mass State Plane Coordinates, mainland zone	NA	Precisely defined	State $50	State	Arc/Info PATs for points and grid polygons	Exists also as TIC registration points
Community Boundaries	MassGIS/ USGS	Digitized from stable base separates of 7.5 minute USGS quadrangles; Coastline appended from USGS 1:100,000 DLGs	1:25,000	NMAS: +/- 41.6 feet at 1:25,000	State $100	State	Arc/Info PAT file	
Community Boundaries without coastline	MassGIS and MA DFWELE	Onshore boundaries digitized from stable base separates of 7.5 minute USGS quadrangles; offshore boundaries digitized from NOAA charts	1:25,000 onshore, 1:80,000 offshore	Varies	State $100	State	Arc/Info AAT file PAT file	With no islands along the shore, single polygons for each town facilitate 1:1 relates and analyses.
Major Roads	MassGIS/ USGS	Extracted from USGS 1:100,000 transportation DLGs. 1:100,000 transportation DLGs produced similarly to 1:100,000 hydrography DLGs, except with less generalization.	1:100,000	Estimated at +/- 100 feet	State $100	State	Arc/Info AAT file	Includes roads which are part of the INTERSTATE, US, or STATE highway systems; these are coded as types in the AAT.
Roads	MassGIS/ USGS	USGS scanned 1:100,000 transportation DLGs.	1:100,000	Estimated at +/- 100 feet	7.5 minute quadran-gles $50	State	Arc/Info AAT file	Linework generally excellent except for some mis-shapen road intersections. Each coverage contains 5 pairs USGS major & minor codes. Roads are also coded by type. Linework for major roads are part of this datalayer.
Trains	MassGIS/ USGS	Extracted from USGS 1:100,000 transportation DLGs	1:100,000	Estimated at +/- 100 feet	State $50	State	Arc/Info AAT file	Includes railroads from USGS 1:100,000 scale maps.

Data Layer & Status	Organi-zation	Source Data and Automation Type	Source Scale	Data Accuracy	Tile Unit Cost/ Tile	Data Extent	Data Format & Feature Type	Additional Comments
TransIines	MassGIS/ USGS	Extracted from USGS 1:100,000 transportatlon DLGs	1:100,000	Estimated at +/- 100 feet	State $50	State	Arc/Info AAT file	Includes pipelines, transmission lines, and miscellaneous transportation features
Elevatlon Contours 1:250,000	MassGIS/ USGS	LIne coverage of 30 foot elevation contour Intervals; generated from Defense Mapplng Agency 3 arc-second digital elevation model.	DMA 1:250,000 DEMs	Vertlcal: 30 feet; Horizontal: not calculated	20 unlque panels $50	State	Arc/Into AAT file	Not consistentwith other MassGIS base map data: contour lines may overlap hydrography. Some areas mlssing from DMA.
Hypsography	MassGIS/ USGS	Digitlzed USGS 1:25,000 hypsography DLGs. Contour lines at 3 meter intervals are Included.	1:25,000	NMAS (?) +/- one contour interval	7.5 minute quadran-gle $100	40+ 7.5 minute quadran-gles (out of 210).	Arc/Info AAT file	Contour elevation, measure in feet, is stored in the AAT.
Hydrography 1:100,000 ponds, lakes and double-lined streams	MassGIS/ USGS	USGS 1:100,000 scanned hydrography DLGs. Produced from 1:24,000 photo reduced quadrangles which were spliced together and scribed prior to scanning. Cartographic generalization was introduced during the scribing process.	1:100,000	NMAS (?) +/- 167 feet at 1:100,000	Four regional tiles $150 with stream panel	State	Arc/Info PAT file	Approximately 6,000 names of ponds and streams from 1:25,000 quads have been added as annotation.
Hydrography 1:100,000 streams and rivers	MassGIS/ USGS	USGS 1:100,000 scanned hydrography DLGs. See above.	1:100,000	NMAS (?) +/- 167 feet at 1:100,000	Four regional tiles $150 with pond panel	State	Arc/Info AAT file	Annotation -see above.
Hydrography 1:25,000 pond,lakes, streams and rivers, coastline, with additional features in the USGS DLG quadrangles	MassGIS/ USGS	Digitized 1:25,000 USGS quadrangles (9%), 1:25,000 DLGs (49%) and USGS scanned and enhanced 1:100,000 quadrangles (42%). Enhancement of 1:100,000 quadrangles includes addition of 1:25,000 hydrologic features not represented at 1:100,000. Edgematching between disparate sources.	1:24,000 & 1:25,000, 1:100,000 enhanced with 1:25,000	Varies	7.5 minute quadran-gle $50	State	Arc/Info AAT file PAT file	1:100,000 enhanced sections will be supplanted by scanned and coded 1:25,000 quadrangles as they become available. The first area to be completed will be the Quabbin, Ware, Wachusett Watersheds.
Coastline 1:25,000	MassGIS/ USGS	Extracted from USGS 1:25,000 DLGs. Digitized where DLG coverage was not available.	1:25,000	NMAS	7.5 minute quads $25	State coastline	Arc/Info AAT file	Extracted from above layer.

Data Layer & Status	Organi-zation	Source Data and Automation Type	Source Scale	Data Accuracy	Tile Unit Cost/ Tile	Data Extent	Data Format & Feature Type	Additional Comments
Land Use - 1985	MassGIS	Interpreted from 1:40,000 9"x9" color infrared photography flown in Summer of 1985 (Southeastern Mass in September of 1984). Twenty-one land use/cover classes interpreted. Wetlands include only non-forested wetlands. 1971 classificationsare also embedded in the database.	1:25,000	Not estimated	Town $100	State	Arc/Info PAT file	Communities in Southeastern Regional Planning & Economic Development District west of Buzzards Bay have a total of 28 categories. Communites of Cape Cod have a total of 26 categories.
Land Use - 1990/1991/1992	MassGIS	Cape flown in 1990 and Is photoInterpreted. Balance of state flown in Springs of 1991 and 1992. Completion date for compilation and automation not known presently.	1:25,000	Not estimated	Town $100	Cape Cod	Arc/Info PAT file	
Major Drainage Basins	MassGIS and MA DFWELE	Dissolved from digitized 1:24,000 sub-basins to produce 28 major drainage basins as defined by the USGS Water Resources Division and the MA Water Resources Commission.	1:24,000	Not estimated	State $100	State	Arc/Info PAT file	Each basin includes an ID and name. Because of way sub-basins were delineated, the mouth of a basin was often marked at the site of a stream gauging station rather than its geographical mouth.
Drainage Sub-basins	MassGIS/ USGS	Based on work over the past 20 years by the USGS Water Resources Division, 1:24,000 manuscripts digitized to produce approximately 1,800 sub-basins. Sub-basin often demarcated by presence of gauging station rather than mouth of a river. Additional linework added by DEP DWS for Outstanding Resource Waters and CZM groundwater divide of Cape Cod.	1:24,000	Not estimated	Four regional tiles $100	State	Arc/Info PAT file AAT file	
Aquifers	MassGIS	USGS 1:48,000 Hydrologic Atlas series on groundwater favoribility, produced from photographically reduced and merged 1:24,000 USGS quadrangles.	1:48,000	Not estimated	Twenty regional tiles $100	State	Arc/Info PAT file	Definition of high and medium yield varies between panels. Yield and transmissivity are given in the PAT.
EPA Designated Sole Source Aquifers	MassGIS & Mass DEP/DWS	Aquifers designated by US EPA as the "sole or principal source" (more than 50% with no alternatives) of drinking water for a given aquifer service area. Digitized from various source maps.	Unknown	Not estimated	State $50	State	Arc/Info PAT file	

Data Layer & Status	Organi-zation	Source Data and Automation Type	Source Scale	Data Accuracy	Tile Unit Cost / Tile	Data Extent	Data Format & Feature Type	Additional Comments
DEP Approved Zone IIs	MassGIS & Mass DEP/DWS	Interim and approved Zone IIs compiled by DEP Division of Water Supply. There are currently 143 approved Zone IIs statewide. Digitized from 1:25,000 DEP/DWS Protection Atlas. Definition of Zone IIs is defined in 310 CMR 22.02, but in short a Zone II is 'that area of an aquifer that contributes water to a well under the most severe pumping and recharge conditions...'	1:25,000	Not estimated	State $100 includes Interim Wellhead Protection Areas	State	Arc/Info PAT file AAT file	Data are used in association with Community Public Water Supplies data layer. Identifiers handle Zone IIs overlap. Lines are coded with zone II IDs. IDs are keyed to specific DEP/DWS technical documents.
DEP Interim Wellhead Protection Areas	MASS DEP/DWS	Interim Wellhead Protection Areas are represented by 1/2 mile buffers around ground water sources. These areas protect a ground water source where no Zone II has been approved by DEP DWS.	1:25,000	Not estimated	State $100 includes DEP Approved Zone IIs	State	Arc/Info PAT file AAT file	
Community Public Water Supplies	MassGIS & Mass DEP/DWS	Compiled and digitized by DEP Division of Water Supply from 1:25,000 DEP Water Supply Protection Atlas. Contains 1,435 public community water supplies, both ground and surface water.	1:25,000	Not estimated	State $100	State	Arc/Info PAT (points) file	Water supplies as defined in 310 CMR 22.00. Non-community public water supplies under this act and Fed. Safe Drinking Water Act not included.
Protected and Recreational Open Space	MassGIS	Compiled on 1:25,000 manuscripts (either USGS quads or MassGIS produced base maps). Includes both conservation and recreation lands. Federal, state and large non-profit lands relatively complete for state. Town lands and smaller non-profits incomplete although major new updating effort is underway. Recreation based open space and recreational faicilities (such as swimming pools) are also being compiled.	1:25,000	Not estimated	County $50	State	Arc/Info PAT file	The delineation of protected parcels of land is not being done at survey level accuracy due to the nature of data available. Preservation of relative accuracy rather than absolute accuracy is the goal. Attribute data includes name of the fee owner, the type of interest in the parcel, the parcel manager and the level of protection.
Areas of Critical Environmental Concern	DEM, EOEA CZM	Polygon coverage showing areas designated as ACECs by the Secretary of Environmental Affairs.	1:25,000 manuscri pts	not estimated	State $50	State	Arc/Info PAT file	ACEC boundaries match MassGIS base map features.

Data Layer & Status	Organi-zation	Source Data and Automation Type	Source Scale	Data Accuracy	Tile Unit Cost/ Tile	Data Extent	Data Format & Feature Type	Additional Comments
DEP Permitted Solid Waste Facilities	DEP DSWM	Point coverage showing sanitary landfills permitted or registered with DEP since 1971.	1:25,000 manuscri pts	not estimated	State $100	State	Arc/Info PAT file	
Surficial Geology	MassGIS/ USGS	Showing sand and gravel deposits, till and bedrock, alluvial floodplains and fines. Thickness ranges are available for sand and gravel deposits. This map was compiled intially onto 1:25,000 sheets and later recompiled onto a 1:125,000 basemap which in turn was photo-enlarged from a 1:250,000 basemap.	1:125,000	Not estimated	County $50	State	Arc/Info PAT file	Two codes indicating surficial sand and gravel or till and bedrock.
Natural Heritage Program Rare Wetlands Wildlife Habitat	Mass Natural Heritage Program (NHP)	Estimations of habitats of state-listed rare wetlands wildlife populations compiled and digitized from 1:25,000 quadrangles. These areas are delineated in accordance with the Wetlands Protection Act (310 CMR 10.00)	1:25,000	Not estimated	State inquire with NHP for pricing	State	Arc/Info PAT file	Updated yearly.
Natural Heritage Program Priority Habitat Areas of state-listed rare species	Mass Natural Heritage Program (NHP)	Estimations of the most important natural communities and state-listed rare species habitats compiled and digitized from 1:60,000 topographic quadrangles. This datalayer has no regulatory significance.	1:60,000	Not estimated	State inquire with NHP for pricing	State	Arc/Info PAT file	Updated yearly.
Census Town Geography	MassGIS	Town Census Geography files include all TIGER line work and population and population density by census block. Derived from US Census TIGER/Line files.	Varies; Primarily USGS 1:100,00 DLGs	Not estimated	Town $50 County $150	8 counties available, 6 in progress	Arc/Info PAT file AAT file ADD file	Blocks have population, population density, median income and number of housing units. Zip Code, FIPS code, MassGIS town code, census tract code associated with town based PATs. Related file gives address ranges in metropolitan areas.

Data Layer & Status	Organi-zation	Source Data and Automation Type	Source Scale	Data Accuracy	Tile Unit Cost/ Tile	Data Extent	Data Format & Feature Type	Additional Comments
Census County Block Groups	MassGIS	Polygon coverage of county block groups with associated demographic data including population, housing units, median income of all persons, percent of units with off-site water, percent of units with off-site sewage.	Varies; Primarily USGS 1:100,000 DLGs	Not estimated	County $50	8 counties available, 6 in progress	Arc/Info PAT file	Block groups have the same information as blocks plus water source, sewage type. Other data is available from Census Bureau STF. Zip Code, FIPS code, MassGIS town code, census tract code associated with town based AATs. Related file gives address ranges.

DATALAYER DESCRIPTIONS

The following pages describe each of the GIS datalayers maintained by MassGIS and available to the public. MassGIS data can be divided into three broad categories described below: **base map** data, **environmental** data, and **census** data. (An overview of the census data category is provided later in this section.) Note that the date below each Description title represents the month and year that the data first appeared in our catalog or the date of the datalayer's most recent update.

Base Map data at 1:100,000 and 1:25,000

In its role as a repository for GIS data shared among EOEA agencies, MassGIS is responsible for maintaining the "base map" datalayers which commonly appear on many kinds of maps. These datalayers include features such as roads, streams, and political boundaries--relatively permanent, widely used features. Most of the base map datalayers maintained by MassGIS have been derived from USGS data and represent many of the feature types found on USGS topographic maps.

Several of the MassGIS base map features are available in two scales. **"Regional" scale** datalayers were typically compiled from 1:100,000 scale maps and are suitable for spatial analysis of relatively large areas--for example, counties or the entire state of Massachusetts. So-called **"Quad" scale** datalayers were typically compiled from 1:25,000 scale maps (the scale used on the popular USGS 7.5 minute topographic map quadrangles) and are suitable for spatial analysis of somewhat smaller areas such as Massachusetts towns. MassGIS is expanding the number of base map datalayers available at "Quad" scale.

As yet, MassGIS has no base map features available at a **large scale** suitable for spatial analysis within towns or of individual parcels of land. A 1:5,000 scale base map, one of the products of the statewide Digital Orthophotography project underway this year, will eventually meet the requirements for large scale projects.

Environmental data

In addition to base map data, MassGIS distributes datalayers developed by EOEA and its sub-agencies. This includes data developed by these agencies for the purpose of enforcing environmental regulations or in support of various types of environmental analysis. Responsibility for maintaining and updating these datalayers remains with the agencies which produced them, as indicated in the individual descriptions. Many of these datalayers were compiled at "Quad" scale and are suitable for spatial analysis with the MassGIS base map data.

A note about scale and datum

GIS data can be displayed at any scale, but disregarding the scale of the source material can lead to poor results. For example, if the Hypsography datalayer (contour lines compiled at the very small scale of 1:250,000) is displayed at 1:25,000, contour lines will appear to cross lakes and ponds compiled at a larger scale--an obvious error. Likewise, 1:25,000 scale Hydrography can be displayed at 1:12,000 (the scale of one inch to 1,000 feet used by many town planners) but this may make evident other data errors.

The datum for the MassGIS database is NAD27. However, with the addition of the orthophotos to our database, NAD83 will become the standard datum for MassGIS. Though the orthphotos are represented in State Plane Meters, the units for our database, either State Plane Feet or Meters, has not yet been determined.

Quadrangle Template Datalayer
March 1989

OVERVIEW

MassGIS has adopted the Massachusetts State Plane Coordinate System (SPC) as its standard coordinate reference system, using the mainland zone throughout the state. The quadrangle template datalayer contains the boundaries and Massachusetts State Plane Coordinate values of the corners of the 189 1:25,000 USGS topographic sheets that cover Massachusetts. This datalayer is of great utility to any project planning to digitize information that has been compiled onto the 1:25,000 quad sheets because it insures that the data will register to the other datalayers in the MassGIS system. This datalayer is stored as a single statewide coverage named **QUADS**.

PRODUCTION

MassGIS project staff devised a simple numbering system to identify each quadrangle and the corners of all quadrangles. Staff then used an MDPW calculator containing a USGS program that translated the longitude and latitude of the quadrangle corners into Massachusetts State Plane Coordinate values. These values were put into an INFO database and used to generate an ARC/INFO datalayer. Arcs delineating the quadrangle borders were also generated.

ATTRIBUTES

The **Quads.PAT** contains two items of note:

QUADS-ID	the unique identifier for each quadrangle
QUAD-NAME	the USGS name for each quadrangle

The **Quads.TIC** contains three items:

IDTIC	the unique identifier for each quad corner
XTIC	the number of feet east of the SPC origin
YTIC	the number of feet north of the SPC origin

This datalayer has an INFO documentation file attached to it. It is named the **QUADS.DOC.** It lists pertinent facts about source material and production techniques used in the creation of this coverage.

EDITING

MassGIS carefully proofread the SPC coordinates of the quad corners. Many plots were made at 1:25,000 and smaller scales.

MAINTENANCE

A datalayer notebook is being maintained by the MassGIS. Any updates or corrections sent to MassGIS will be recorded, and datalayer modifications will be made as required.

FEE: $50.

Digital Quadrangle Template Datalayer
April 1993

OVERVIEW

U.S. Geological Survey's Digital Line Graph (DLG) data is available through MassGIS. The panelling scheme for the 1:25,000 (DLG) data is based on this digital quadrangle template of 210 quadrangles. The grid differs from the Quadrangle Template, which is based on the 1:25,000 USGS 7.5 minute topographic quadrangles. For most of Massachusetts, though, the panelling schemes are identical. The quadrangle panels and numbering scheme vary along the coast, primarily for the Cape and Islands quads. Please refer to the appendix for a map of both grids and a listing of the corresponding datalayers that are panelled by each grid. This datalayer is stored as a single statewide coverage, **USGS-GRID**.

PRODUCTION

The datalayer was generated by the Arc/Info GENERATE command. Using the PROJECT command, the coverage was projected into Massachusetts State Plane Feet. The coverage was then built and attributes added to the polygons to identify the digital quadrangles. One additional quad was added to the coverage for ease of processing some of the coastal data. This quadrangle (DIG-ID = 158-S), however, may not correspond to USGS DLG data.

ATTRIBUTES

The **USGS-GRID.PAT** contains the two items to identify each quadrangle:

QUAD-NAME	25	25	C	Quadrangle name
DIG-ID	5	5	C	Quadrangle identifier; may have a -W,-E or other extension

MAINTENANCE

This datalayer is being maintained by MassGIS.

PRICE: $50.

MA State Plane Grid and Points Datalayer
March 1989

OVERVIEW

The MassGIS has adopted the Massachusetts State Plane Coordinate System (SPC) as its standard coordinate reference system, using the mainland zone throughout the state. MassGIS has generated an SPC grid called **GRID-SPC10K**. Its grid block size is 10,000 feet on a side. The point coverage is called **PTS-SPC10K**. The points were derived from the grid intersections on the GRID-SPC10K datalayer. Either of these coverages can be plotted on a map as coordinate reference. The plotting of coordinates on a map enables that map to be used as a compilation manuscript for further data automation. The grid or points can be used as 'TICS' to register the plot/manuscript on the digitizing table. This is of great utility to any project planning to digitize information that needs to be compiled onto GIS plots because it insures that the new data will register to the other datalayers in the MassGIS system. These two datalayers are stored as single statewide coverages.

PRODUCTION

MassGIS staff produced GRID-SPC10K using the ARC/INFO command GENERATE. The grid starts at the origin of the Massachusetts SPC Mainland Zone and has a grid block size of 10,000 feet on a side. MassGIS then made PTS-SPC10K by using the ARC/INFO command NODEPOINT, in which each node of the grid was converted into a point in the new datalayer. Next the SPC northing and easting of each point was added to the attribute database (.PAT) using the command ADDXY.

ATTRIBUTES

The **SPC-PTS.PAT** contains two items of note:

X-COORD	the number of feet east of the SPC origin
Y-COORD	the number of feet north of the SPC origin

EDITING

MassGIS carefully proofread the SPC coordinates of the quad corners.

MAINTENANCE

A datalayer notebook is being maintained by the MassGIS. Any updates or corrections sent to MassGIS will be recorded, and datalayer modifications will be made as required.

FEE: $50. for both coverages.

Community Boundaries Datalayer
March 1991

OVERVIEW

The political boundary datalayer is a 1:25,000 scale datalayer containing the boundaries of the 351 communities in Massachusetts. The seaward boundary of coastal communities has been defined at mean high water in this datalayer. The datalayer is named **TOWNS**, and it is stored as a single statewide coverage.

PRODUCTION

This datalayer, except the coastline, was digitized by MassGIS from a set of stable based film prints of the 1:25,000 7.5' quadrangles purchased from the USGS by the Massachusetts Dept. of Public Works. The coastline was taken from the USGS 1:100,000 hydrography DLG database. It was selected visually and appended to the digitized town boundaries.

ATTRIBUTES

Several items have been added to the **Towns.PAT**

ITEM NAME	WIDTH	OUTPUT	TYPE	N.DEC	ALTERNATE NAME	Contents
AREA	4	12	F	3		
PERIMETER	4	12	F	3		
TOWNS-2#	4	5	B	0		
TOWNS-2-ID	4	5	B	0		
TOWN-ID	4	5	B	0	MASSGIS-TOWN-COD	MassGIS Town-ID Code (alphabetical, 1-351)
TOWN	21	21	C	-	TOWN-NAME	Town Name
FIPS-STCO[1]	5	5	I	-	FIPS-ID	Federal Information Processing Standard (FIPS) State/County Code
CCD/MCD[2]	3	3	C	-	CENSUS-TOWN-CODE	US Census Town Code
FIPS-PLACE[2]	5	5	C	-	FIPS-TOWN-CODE	Federal Information Processing Standard (FIPS) Town Code
POP80[1]	7	9	I	-	CEN-POPULATION80	US Census Town Population: 1980
POP90[2]	7	9	I	-	POP	US Census Town Population: 1990
ISLAND	1	1	I	-		Polygon is (1)/is NOT (0) an island - many towns are composed of many polygons.
*** REDEFINED ITEMS ***						
FIPS-MCD[2]	8	8	I	-	FIPS+CEN-TOWN-CO	FIPS State & County & Census Town Code concatenated
FIPS-COUNTY[2]	3	3	I	-	COUNTY-CODE	FIPS County only code

[1] Signifies that ITEM NAME has changed from previous version of TOWNS.
[2] Signifies that this is a NEW ITEM, not present in previous version of TOWNS.

A **TOWNS.AAT** was created. An item called OUTLINE was added. It identifies the outside polygon of the state. This enables differentiation of line type (e.g. dashed lines inside the state and solid for the outside). The outline = 1, internal boundaries = 17 (a dashed line in the MassGIS default symbolset).

Annotation has been added to the coverage. Each community is named within its border.

MAINTENANCE

A datalayer notebook is being maintained by the MassGIS. Any updates or corrections sent to MassGIS will be recorded, and datalayer modifications will be made as required.

PRICE: $100.

Community Boundaries without Coast Datalayer
April 1992

OVERVIEW

The political boundary coverage is a datalayer containing onshore and offshore boundaries for the 351 communities of Massachusetts. Note that **no** coastline appears in this data. The datalayer is called **BOUNDARIES** and is stored as a statewide coverage.

MANUSCRIPT

Sources of this data are Chapter 196 Acts of 1881 boundaries drafted onto 1:80,000 NOAA charts and town boundaries from the USGS 1:25,000 topographic series published on stable based film.

ATTRIBUTES

The coverage .AAT has an item, **TYPE**, that allows you to choose either onshore boundaries ('dry') with **TYPE = 1**, or offshore boundaries ('wet') with **TYPE = 2**.

This data layer also has a .PAT with the following items:

ITEM NAME	WDTH	OPUT	TYP	N.DEC	ALTERNATE NAME	DESCRIPTION
AREA	4	12	F	3		
PERIMETER	4	12	F	3		
BOUNDARIES#	4	5	B	0		
BOUNDARIES-ID	4	5	B	0		
TOWN-ID	4	5	B	0	MASSGIS-TOWN-COD	MassGIS Town-ID Code (alphabetical, 1-351)
TOWN	21	21	C	-	TOWN-NAME	Town Name
FIPS-STCO	5	5	I	-	FIPS-ID	Federal Information Processing Standard State/County code
CCD/MCD	3	3	C	-	CENSUS-TOWN-CODE	US Census Town code
FIPS-PLACE	5	5	C	-	FIPS-TOWN-CODE	Federal Information Processing Standard Town code
POP80	7	9	I	-	CEN-POPULATION80	US Census Town population 1980
POP90	7	9	I	-	POP	US Census Town population 1990

PRODUCTION

The onshore community boundaries were digitized by MassGIS from a set of stable based film prints of the 1:25,000 7.5' USGS quadrangles. Offshore boundaries were digitized by DFWELE from 1:80,000 NOAA charts. The two were merged into one complete boundaries coverage. Along the eastern portion of the state offshore boundaries include those town boundaries that fall within rivers and other water bodies. For western Massachusetts all town boundaries are currently coded as onshore, 'dry' boundaries.

Note: The outer boundaries based on the Acts of 1881 do not necessarily coincide with the limits of the state territorial waters or state or town jurisdiction.

MAINTENANCE

MassGIS and DFWELE are maintaining this datalayer.

Price: $100.

Major Roads Datalayer
April 1993

OVERVIEW

MassGIS has defined major roads as roads that are part of the INTERSTATE, US, or STATE highway systems. The datalayer, called **MAJ-RD**, contains approximately 64,000 vertices, 1,900 arcs, and 1500 pieces of annotation. It is stored as a single statewide coverage.

SOURCE

MAJ-RD is based on the USGS 1:100,000 Digital Line Graph (DLG) transportation quadrangle files. These DLG files are available for all of Massachusetts. MassGIS has also extracted railroad lines from the DLG's and put them into a separate statewide coverage. The individual DLG transportation quadrangle files, which contain all road features found on the 1:25,000 paper quads, are used by MassGIS as a detailed roads datalayer (See **ROADS** datalayer description).

PRODUCTION

The DLG quad files were reformatted into ARC/INFO coverages and projected into the Massachusetts State Plane Coordinate System. The DLG's include attributes for both the highway type (Major Code 172,173, and 174) and a Minor code that contains the actual route number. (See USGS Publication *Digital Line Graphs from 1:100,000-Scale Maps.*) Based on these attributes, MassGIS project staff **Reselected** the major roads and **Put** them into a new coverage.

Because this datalayer is meant to be used for statewide maps, or in conjunction with the complete DLG road quads on larger scale maps, complex highway intersections were deleted. Unnecessary (pseudo) nodes remaining from the complete DLG quads were removed using the **Unsplit** command. This greatly reduced the total number of arcs in the datalayer without affecting detail.

ATTRIBUTES

New items for Interstate, US, and State route numbers were added to the database. The values were calculated equal to the Major and Minor items of the original DLG's. The final **MAJ-RD.AAT** has the following additional items:

US-ROUTE	the route number of US Routes
STATE-ROUTE	the route number of State Routes
STATE-ROUTE-TXT	alpha suffix e.g. A for Route 1A)
INTER-ROUTE	the route number of Interstate Highways)
TYPE	1=INTER, 2=US, 3=STATE

Annotation has been added to this data using SHIELD-ANNO, a macro program written by project staff. The highway number appears inside the correct highway shield in an appropriate location near the highway. **Textset Road** and **Textfont 30** are needed to display the annotation correctly. These files will be distributed upon request with the Major Roads coverage. This textset is not currently available on PC ARC\INFO and at present cannot be imported to it.

EDITING

A checkplot on mylar was made for editing purposes. It was made at 1:190,000 to match the 1" = 3 mile Mass Dept. of Public Works basemap. This basemap and the paper USGS 1:25,000 sheets were used as references when editing the checkplot.

Numerous errors and omissions were identified and corrected. Most involved missing or incorrectly identified major roads. In most cases, the correct but mislabeled road was found in the original DLG file It was **Copied** from there and **Appended** to MAJ-RD.

MassGIS staff also met with Massachusetts Dept. of Public Works staff and gathered data on a number of **changes to the highway system** that have occurred since the DLG's were produced. These changes were compiled onto 1:25,000 quad sheets, digitized, and appended into the datalayer.

This datalayer has an attached INFO documentation file, named the **MAJ-RD.DOC**. It lists pertinent facts about source material and production techniques used in the creation of the datalayer.

MAINTENANCE

A datalayer notebook is being maintained by the MassGIS. Any updates or corrections sent to MassGIS will be recorded, and datalayer modifications will be made as required.

A major update by the Massachusetts Highway Department and Central Transportation Planning Staff is currently underway. The coding will include road width, vehicle miles, pavement condition and other road attributes.

FEE: $100.

Roads (1:100,000) Datalayer
March 1991

OVERVIEW

MassGIS has converted the USGS 1:100,000 Digital Line Graph files into ARC/INFO coverages in the Massachusetts State Plane Coordinate System. The linework is excellent. All roads on the 1:25,000 USGS quadrangle sheets are included in these coverages, although generalized slightly. The data is stored as 189 individual quadrangle coverages named **RDS<QUAD-ID>**. See the attached list of quadrangle names and QUAD-ID numbers.

ATTRIBUTES

Each coverage contains 5 pairs of Major and Minor Items which contain many codes including the route numbers for Federal, US, and State numbered highways. In addition, MassGIS added an Item called **Secondary** with the following Minor codes calculated:

Coding for COLUMN SECONDARY:

0	=	neatline or Major Road
1	=	Secondary paved road
211	=	Trail Class 5 other than 4-wheel drive (USGS DLG Minor Code 211)
212	=	Trail Class 5 4-wheel drive only (USGS DLG Minor Code 212)
9	=	Highway Interchanges (USGS DLG Minor Code 402)

More information about the 1:100,000 DLG's including the Major/Minor code descriptions can be found in the USGS National Mapping Division Publication, *Digital Line Graphs from 1:100,000-Scale Maps*.

The **Major Roads Datalayer** was extracted from these coverages, but contains corrections and updates **not** transfered back into the **ROADS** quadrangles. Production of the Major Roads Datalayer revealed many attribute coding errors.

MAINTENANCE

MassGIS is **not**, at present, revising or updating this datalayer. MassGIS will add any corrections to the datalayer notebook for possible revisions in the future.

PRICE: $50. per quad.

Transportation: Railroads and Transmission Lines Datalayers
March 1993

OVERVIEW

The U.S. Geological Survey (USGS) distributes Digital Line Graphs (DLG) from its 1:100,000-scale maps showing railroads, pipelines, transmission lines, and other miscellaneous transportation features. MassGIS has assembled these data into two statewide coverages: **TRAINS** (railroads only) and **TRANSLINES** (consiting of the remaining transportation features identified by USGS).

All railroads and additional transportation features on the 1:100,000 USGS quadrangle sheets are included in these coverages. Although the railroads, pipelines, and transmission lines appear on maps, they are not necessarily in active use. The linework is generally excellent, although MassGIS has noted that some railroads are discontinuous (not perfectly edgematched) at USGS 1:100,000 quadrangle boundaries.

ATTRIBUTES

The **TRAINS** arc attribute table (AAT) includes the following MAJOR and MINOR code attributes from the original DLG files:

MAJOR	Description
180	Railroad
181	Minor code indicates number of tracks
189	Coincident feature

MINOR	Description
201	Railroad
202	Railroad in street or road
208	Railroad siding
209	Perimeter or limit of yard
210	Arbitrary line extension
601	In tunnel
602	Overpassing, on bridge
603	Abandoned
605	Underpassing

The **TRANSLINES** arc attribute table (AAT) includes the following MAJOR and MINOR code attributes from the original DLG files:

MAJOR	Description
190	Translines
199	Coincident feature

MINOR	Description
201	Pipeline
202	Power transmission line
203	Telephone or telegraph line
204	Aerial tramway, monorail, or ski lift
205	Arbitrary line extension
206	Closure line
403	Landing strip, perimeter of airport
408	Measuring station

More information about the 1:100,000 DLG files including the major/minor code descriptions can be found in the USGS National Mapping Division publication, *Digital Line Graphs from 1:100,000-Scale Maps*.

MAINTENANCE

MassGIS is **not**, at present, revising or updating the linework in these datalayers. MassGIS will add any corrections to the datalayer notebook for possible revisions in the future. The DEM Division of Resource Conservation is in the process of compiling data on the ownership and active status of railroad lines; when this information is complete, it will be included in the **TRAINS** arc attribute table.

PRICE: $50

Hypsography (Topographic Contours) Datalayer
November 1990

OVERVIEW

MassGIS obtained the USGS 1:25,000 Hypsography Digital Line Graph from the USGS National Mapping Division. These files were converted into ARC/INFO coverages and projected into the Massachusetts State Plane Coordinate System. The linework is excellent. All contour lines, at a 3 meter interval, appearing on the 1:25,000 USGS quadrangle sheets are included in these coverages. The data are stored as 189 individual quadrangle coverages named **HYPSO<QUAD-ID>**. The hypsography data are **NOT** available for the entire state. See the listing at the end of this description for the quadrangles which have hypsography available.

ATTRIBUTES

Each coverage has had an item named **ELEV** added to the .AAT file. **ELEV** is filled with the elevation value of each contour line. Since the cartographic data base (x,y coordinates) is stored in feet, MassGIS **converted** the contour elevations (z coordinates) stored in **ELEV** from meters to **feet**. Because the published vertical accuracy of USGS topographic lines is **+/- one contour interval** (in excess of 9 ft.), MassGIS truncated the value stored in **ELEV** to an even foot. Further, all elevation values that were identified as negative numbers (positive elevation values with USGS MINOR codes of 205 or 206) were converted into actual negative numbers in **ELEV**.

Each coverage also has an ancillary INFO table called **HYPSO<quad-id>.ACODE** which can be related to .AAT file. This .ACODE file stores all of the original DLG coding. Included in this original coding is the elevation value of each line stored as **meters**. Each .ACODE file also contains several pairs of Major and Minor Items. The actual number of Major/Minor pairs varies from quad to quad. A **MAJOR-CODE = 24** signifies that the MINOR-CODE of that pair will contain the elevation value. The following is an example of what a typical .ACODE file might look like:

HYPSO<quad-id>-ID	Unique ID number for RELATING back to the .AAT file
MAJOR1	The USGS DLG Major Code
MINOR1	The USGS DLG Minor Code
MAJOR2	"
MINOR2	"
MAJOR3	"
MINOR3	"
MAJOR4	"
MINOR4	"
MAJOR5	"
MINOR5	"
majorN	"
minorN	"
ELEV	Contour line elevation stored in feet.

More information about the 1:25,000 DLG's including detailed descriptions of the Major/Minor code scheme can be found in the USGS National Mapping Division Publication, *Digital Line Graphs from 1:24,000-Scale Maps* (Massachusetts is the only state which has quads produced using the metric system, and a 1:25,000 scale).

MAINTENENCE

MassGIS is **not**, at present, revising or updating this datalayer. MassGIS will add any corrections to the datalayer notebook for possible revisions in the future. The entire state is **not yet available**. MassGIS will continue to cooperate with USGS if at all possible in completing this datalayer.

Massachusetts QUADS Which Have Hypsography Data Available

Quad-ID	Quad Name
62	WARE
64	WALES
68	NORTH BROOKFIELD
69	EAST BROOKFIELD
70	SOUTHBRIDGE
74	PAXTON
75	LEICESTER
76	WEBSTER
80	WORCESTER NORTH
81	WORCESTER SOUTH
82	OXFORD
86	SHREWSBURY
87	GRAFTON
88	UXBRIDGE
92	MARLBOROUGH
93	MILFORD
94	BLACKSTONE
114	LEXINGTON
116	NORWOOD
119	SOMERSET
120	FALL RIVER
121	TIVERTON
122	HAVERHILL
127	BLUE HILLS
130	ASSONET
131	FALL RIVER EAST
132	WESTPORT
133	EXETER
134	NEWBURYPORT WEST
135	GEORGETOWN
136	SALEM
137	LYNN
138	HULL
139	WEYMOUTH
146	NEWBURYPORT EAST
147	IPSWICH
148	MARBLEHEAD NORTH
149	MARBLEHEAD SOUTH
150	NANTASKET BEACH
151	COHASSET
159	GLOUCESTER
168	ROCKPORT

FEE: $100. per quad.

Contours (1:250,000) Datalayer
February 1990

OVERVIEW

The 1:250,000 Hypsography datalayer is a statewide coverage of contours at a 30 ft. interval. It was created by MassGIS from Defense Mapping Agency data as reformatted by the USGS National Mapping Division. It consists of 28 individual coverages which are generically named **HYP250-<NUM>** where <num> is a number from 1 to 28.

MANUSCRIPT

The source data are the digital elevation models created by the Defense Mapping Agency at a nominal 1:250,000 scale. The original digital elevation files consist of a one degree square array of elevation values at 3 arc-second intervals, (approx. 200 ft.), measured in integer meters. This source data has been classified as level 1 by the USGS, which means that the root mean square error of any sample point is expected to be less than one-half contour interval. In practice, this means that a spot elevation interpolated from contours plotted at an appropriate interval (not less than 20 ft.) would probably be within 30 ft. of its 'true' elevation. Note that in areas where the elevation value is most rapidly changing the vertical error is likely to be larger, but the horizontal distance to a point at the elevation shown will tend to remain the same.

METHODOLOGY

The original files are too large to process using the ARC/INFO DEMLATTICE command, so they were first broken up into smaller files and formatted as ARC/INFO .svf files using FORTRAN routines. ARC/INFO lattice files were then created using the GRIDLATTICE command and a low-pass FILTER was run on them to 'smooth' the data. The LATTICEOPERATE command was used to convert from meters into feet. Contour coverages were created from the lattice files using a contour interval of 30 feet, which was consistent with the input scale of the data. The contour coverages were then PROJECTED into state plane feet, and rounded off to even feet.

ATTRIBUTES

This datalayer has a **.AAT** (arc attribute table) with the attribute CONTOUR.

NOTE: It is essential that these data be used at a regional scale consistent with the scale of the source data which is 1:250,000. Not all the contours will line up with such MassGIS data layers as the shoreline, the hydrography or the basin lines. Caution should be exercised in producing graphic output. Some significant features are missing from the original data.

PRICE: $50 per panel.

Hydrography (1:100,000) Datalayer
March 1990

OVERVIEW

The MassGIS project has adapted and modified the USGS 1:100,000 Hydrography Digital Line Graph (DLG) quadrangle files to produce two core elements-

ponds and lakes	(approx. 3,500 polygons)
streams and rivers	(approx. 7,300 arcs)

Due to the size of the datalayers, ponds and streams have been split into five panels: **WEST, MID, EAST, SE,** and **ISLE.** To avoid unnecessary splitting of features, these panels follow major drainage divides.

The coastline, the other major hydrography feature, was taken from the DLGs and appended to the manually digitized community boundaries to make TOWNS, the standard MassGIS political boundary map.

PRODUCTION

The DLG quad files were reformatted into ARC/INFO coverages and projected into the Mass. State Plane Coordinate system. The DLGs include extensive attributes that identify feature types (Minor Code 412 = Stream, 421 = Pond, etc.). The concept used by MassGIS was to separate polygon features from line features so that appropriate attribute types and topology could be applied to each-

<stream-panel>.AAT	for single line streams and rivers,
<pond-panel>.PAT	for ponds and lakes.

Doubleline streams and rivers were placed in both panels.

The original attribute coding of the DLGs combined underground aqueducts and manmade surface canals. MassGIS has put the surface canals into the streams & rivers datalayer. Underground aqueducts were put into a separate datalayer, as were cranberry bogs. These coverages have not been edited for general release.

Wetlands were not extracted from the DLGs because more complete data is available from the 1:25,000 land use datalayer.

EDITING

After the features were sorted based on attribute, the individual quad coverages were edgematched into five panels based on drainage basins (see index map). Proofplots were produced and compared to the paper 1:25,000 quads. The 1:100,000 hydrography DLGs were found to be significantly generalized in comparison with the 1:25,000 paper quads. Many small ponds and streams were not automated by USGS. Approximately 30% of the minor streams and 20% of the minor ponds are missing from the 1:100,000 DLGs.

Lines in the DLGs were less detailed than their 1:25,000 counterparts. These differences were not considered 'errors'.

Actual errors were noted and corrected. For example, braided streams and wetlands were sometimes incorrectly coded as ponds. Edges where two blocks of 32 quads met (a USGS

defined unit of production) often did not match. In these cases, streams and ponds were digitized or moved as needed to complete the edgematching process.

POND ATTRIBUTES

Two equivalent items were added to the **pond<-panel>.AAT** to differentiate ponds, double-line streams, and islands:

NAME	the name of the feature
TYPE	character item- P = Pond, DS = Doubleline River, I = Island
FEATURE	numeric item- 1 = Pond, 2 = Doubleline River, 3 = Island
PALIS-ID	a unique ID from the Ponds & Lakes Information System (60% to 70% of ponds have a PALIS number)
BAS-ID	major basin code number- see MAJ-BAS datalayer description

The feature name and PALIS-ID were obtained from the UMass Water Resources Research Center.

STREAM ATTRIBUTES

The **strm-<panel>.AAT** has a unique **strm-<panel>-ID** for each stream segment. The number ranges start in increments of 10,000 for each of the five hydro panels. Two items were added to the **<stream-panel.AAT>** to identify the major drainage basin each stream is in:

BAS-ID	the major basin id#
BAS-NAME	the major basin name, e.g. Merrimack

ANNOTATION

Names of ponds and streams have been added for cartographic display purposes. There are approximately 6,000 names. They were taken from the USGS 1:25,000 quads. The letters are 450 feet high, which makes the annotation useful for output scales ranging from 1:50,000 to 1:100,000.

MAINTENANCE

A datalayer notebook is being maintained by the MassGIS. Any updates or corrections sent to MassGIS will be recorded, and datalayer modifications will be made as required.

PRICE: $150. per panel.

Hydrography (1:25,000) Datalayer
October 1992

OVERVIEW

MassGIS has edited and modified the USGS 1:25,000 Hydrography Digital Line Graph (DLG) quadrangle files and the USGS 1:100,000 Hydrography DLG files and digitized hydrographic features from the USGS 1:25,000 Topographic Quadrangles to produce a hybrid 1:25,000 Massachusetts Hydrography Datalayer. The 1:100,000 DLG features were enhanced by digitizing those streams and ponds from the USGS quadrangles that were not part of the 1:100,000 data.

Due to the size of the datalayer, the hydrography is maintained as 209 separate quadrangles, each identified by **HYDRO<quad-id>**. The panelling scheme may be found at the end of this document, however, the list of quadrangles and data sources are listed here.

PRODUCTION

The DLG quadrangles were converted into ARC/INFO coverages and projected into Massachusetts State Plane Coordinate System. The long list of items (MAJOR1, MINOR1, MAJOR2, MINOR2...) were then concatenated to a more simplified coding system. For each feature MINORn was truncated to three characters and linked to the other minor codes to create MINOR_TOT. For example, a submerged (612) wetland (111) is now coded MINOR_TOT = 612111. The original MAJORn, MINORn pairs are no longer part of the attribute tables.

The Enhanced hydrography is a combination of two sources of data. The 1:100,000 DLGs were split into 1:25,000 quadrangles. The coverages were then enhanced by adding those streams and ponds that are on the 1:25,000 quadrangles, but missing from the 1:100,000 DLGs. Features, such as streams, that appear as polygons with two shores on the quadrangles, but appear as single lines on the 1:100,000 DLGs, were not changed. Linework that is more generalized on the 1:100,000 DLGs than on the quadrangles was not edited either. Only those features that were **missing** from the original 1:100,000 DLGs were added.

A group of quadrangles, principally the islands area, were completely digitized from the 1:25,000 USGS quadrangles. Though not as thoroughly coded as the 1:25,000 DLGs, the linework is all at 1:25,000.

EDITING

All of the digitized quadrangles were checkplotted at 1:25,000, as were the enhanced quadrangles. The 1:25,000 DLG quadrangles were randomly checkplotted. Each of the quadrangles was edgematched to its neighboring quads.

ATTRIBUTES

Each **HYDRO<quad-id>** has both a .PAT and .AAT. The modified DLG coding scheme was used for the enhanced and digitized coverages as well. The coding scheme is extensive and includes a wide variety of features, including ponds, cranberry bogs, impoundments, wetlands, tidal flats, dams, streams, and aqueducts. Only the DLGs have been coded this completely. The other hydrography quadrangles have been coded to include lakes and ponds and rivers and streams.

The items in the .PAT are:

MINOR_TOT	15	15	C	concatenated feature code
SOURCE	3	3	C	data source ENH - 1:100,000 enhanced DLG - 1:25,000 USGS DLG DIG - 1:25,000 digitized quads
** redefined **				
MINOR_NUM	15	15	I	same as MINOR_TOT, integer

The items in the .AAT are:

MINOR_TOT	12	12	C	concatenated feature code
SOURCE	3	3	C	data source ENH - 1:100,000 enhanced DLG - 1:25,000 USGS DLG DIG - 1:25,000 digitized quads
** redefined **				
MINOR_NUM	12	12	I	same as MINOR_TOT, integer

MAINTENANCE

Continued development of this datalayer is underway. Though complete statewide coverage at 1:25,000 or 1:100,000 enhanced is now available, MassGIS intends to improve the quality of this data. Those areas that are now covered by enhanced hydrography will in time be replaced by vectorized 1:25,000 scanned USGS blue color separates. The region presently under development includes those quadrangles covering the Quabbin, Ware and Wachusett watersheds. MassGIS is considering a cooperative effort with USGS to complete the rest of the state with the scanned separates.

This datalayer is being maintained by MassGIS. Any corrections may be forwarded to us and will be catalogued for future updates.

PRICE: $50

The following table lists all the possible codes for a **POLYGON FEATURE** in the .PAT. These codes have been extracted and concatenated from the USGS DLG major/minor pairs. The digitized and enhanced hydrography quadrangles do not have the same level of coding.

MINOR_NUM	DESCRIPTION
101	RESERVOIR
102	COVERED RESERVOIR
105	INUNDATION AREA
106	FISH HATCHERY/FARM
107	INDUST WATER IMPOUND
109	SEWAGE DISP POND
111	MARSH/WETLAND
114	CRANBERRY BOG
115	FLATS
116	BAY/ESTUARY/GULF
122	MDC RESERVOIR
400	RAPIDS
401	FALLS
402	GRAVEL PIT W/WATER
404	PUMPING STATION
406	DAM/WEIR
408	SPILLWAY
410	ROCK
411	CREVASSE
412	STREAM
414	DITCH/CANAL
415	AQUEDUCT
416	FLUME
419	CHANNEL IN WATER
421	LAKE OR POND
422	CORAL REEF
999	LAND/ISLAND
7105	INUNDATION AREA
7111	MARSH/WETLAND
101619	RESERVOIR
101625	RESERVOIR
102111	COV RESERVOIR/MARSH
105007	INUNDATION AREA
105111	INUN AREA/MARSH
109421	SEWAGE POND/POND
109611	SEWAGE POND-ABAND
109619	SEWAGE POND
111007	MARSH/WETLAND
111105	MARSH/INUN AREA
111114	MARSH/CRANBERRY BOG
111608	MARSH-SALT
111612	MARSH-SUBMERGED
114007	CRANBERRY BOG
114111	CRANBERRY BOG/MARSH
115007	FLATS
115020	FLATS
115116	FLATS/BAY
115410	FLATS/ROCK
115412	FLATS/STREAM
115421	FLATS/POND
115422	FLATS/CORAL REEF
115616	FLATS-NAVIGABLE
406618	DAM-EARTHEN
410115	ROCKS/FLATS
411007	CREVASSE
412115	STREAM FLATS
412612	STREAM-SUNKEN
415625	STREAM
419115	CHANNEL FLATS
419616	CHANNEL-NAVIGABLE
421007	LAKE OR POND
421111	POND WETLAND
421610	POND-INTERMITTENT
421612	POND-SUNKEN
421618	POND-EARTHEN
421619	LAKE OR POND
421625	LAKE OR POND
421628	LAKE OR POND
422115	CORAL REEF/FLATS
610402	INTERMIT PIT W/WATER
610421	INTERMITTENT POND
612111	SUBMERGED MARSH
619101	RESERVOIR
619412	STREAM
619421	LAKE OR POND
101111612	SUBMERGED RES MARSH
101619625	RESERVOIR
105007111	INUN AREA/MARSH
105111007	INUN AREA/MARSH
111007105	MARSH/INUN AREA
111007612	MARSH-SUBMERGED
111007625	MARSH/WETLAND
111105007	MARSH/INUN AREA
111114007	MARSH/CRANBERRY BOG
111612007	MARSH-SUBMERGED
111612421	POND MARSH-SUBMERGED
111612619	MARSH-SUBMERGED
111612625	MARSH-SUBMERGED
114007111	CRANBERRY BOG/MARSH
114111007	CRANBERRY BOG/MARSH
421111007	POND MARSH
421619625	LAKE OR POND
421625619	LAKE OR POND
619625415	AQUEDUCT
619625421	LAKE OR POND
101111612625	RES MARSH-SUBMERGED
111612619062	MARSH-SUBMERGED

The following table lists all the possible codes for an **ARC FEATURE** in the .AAT. These codes have been extracted and concatenated from the USGS DLG major/minor pairs. The digitized and enhanced hydrography quadrangles do not have the same level of coding.

MINOR_NUM	DESCRIPTION
109	SEWAGE DISP/FILT BED
200	SHORELINE
201	MANMADE SHORELINE
202	CLOSURE LINE
203	INDEFINITE SHORELINE
204	APPARENT LIMIT
401	FALLS
405	WATER INTAKE
406	DAM/WEIR
407	CANAL LOCK
408	SPILLWAY
409	GATE
412	STREAM
414	DITCH/CANAL
415	AQUEDUCT
416	FLUME
419	CHANNEL IN WATER
422	CORAL REEF
605	RIGHT BANK
606	LEFT BANK
888	NEAT LINE
999	UNKNOWN OR NEAT LINE
7204	APPARENT LIMIT
9606	LEFT BANK
200009	SHORELINE
200201	MANMADE SHORELINE
200606	LEFT BANK/SHORE
200610	INTERMITTENT SHORE
201002	MANMADE SHORELINE
201009	MANMADE SHORELINE
201020	MANMADE SHORELINE
201605	MANMADE RIGHT BANK
201606	MANMADE LEFT BANK
202412	CLOSURE LINE/STREAM
203625	INDEFINITE SHORE
203627	INDEFINITE SHORE
204007	APPARENT LIMIT
204009	APPARENT LIMIT
406009	DAM/WEIR
406017	DAM/WEIR
406618	DAM/WEIR-EARTHEN
412007	STREAM
412009	STREAM
412020	STREAM
412202	STREAM CLOSURE LINE
412601	STREAM-UNDERGROUND
412604	STREAM-TUNNEL
412609	STREAM-UNSURVEYED
412610	STREAM-INTERMITTENT
414009	DITCH/CANAL
414017	DITCH/CANAL
414610	CANAL-INTERMITTENT
414611	CANAL-ABANDONED
415412	AQUEDUCT/STREAM
415601	AQUEDUCT-UNDERGROUND
415604	AQUEDUCT-TUNNEL
415605	AQUEDUCT RIGHT BANK
415611	AQUEDUCT-ABANDONED
601412	UNDERGROUND STREAM
605009	RIGHT BANK
605201	RIGHT BANK-MANMADE
606009	LEFT BANK
606201	LEFT BANK-MANMADE
610200	INTERMITTENT SHORE
610412	INTERMITTENT STREAM
610414	INTERMITTENT CANAL
610421	INTERMITTENT POND
200618406	SHORE/EARTHEN DAM
201009020	MANMADE SHORE
201020002	MANMADE SHORE
201020605	MANMADE RIGHT BANK
201605020	MANMADE RIGHT BANK
201606009	MANMADE LEFT BANK
201606020	MANMADE LEFT BANK
202412617	CLOS LINE/STR UNDERP
406009017	DAM/WEIR
406618017	DAM-EARTHEN
406618200	DAM-EARTHEN/SHORE
412610009	STREAM-INTERMITTENT
412610202	INT STREAM CLOSURE
412610617	INT STRM UNDERPASS
412610202006	INT STREAM CLOSURE

Quadrangles and the Source of 1:25,000 Hydrography

QUAD	SOURCE	QUAD	SOURCE	QUAD	SOURCE	QUAD	SOURCE
1	DLG	60	ENH	119	DLG	171	DLG
2	ENH	61	ENH	120	DLG	172	DLG
3	ENH	62	ENH	121	DLG	173	DIG
4	DLG	63	ENH	121-S	DLG	173-E	DIG
5	DLG	64	DLG	122	DLG	173-S	DIG
6	DLG	65	DLG	123	DLG	173-SE	DIG
7	DLG	66	ENH	124	DLG	174	DLG
8	ENH	67	ENH	125	ENH	174-N	DLG
9	ENH	68	ENH	126	ENH	175	DLG
10	DLG	69	ENH	127	ENH	176	DLG
11	ENH	70	DLG	128	ENH	176-S	DLG
12	ENH	71	DLG	129	ENH	177	DIG
13	ENH	72	DLG	130	DLG	178	DLG
14	ENH	73	DLG	131	DLG	179	DLG
15	ENH	74	DLG	132	DLG	179-N	DLG
16	DLG	75	DLG	132-S	DLG	180	DIG
17	ENH	76	DLG	133	DLG	180-S	DIG
18	ENH	77	DLG	134	DLG	181	DLG
19	ENH	78	DLG	135	DLG	182	DLG
20	ENH	79	DLG	136	DLG	182-E	DLG
21	ENH	80	DLG	137	DLG	183	DLG
22	DLG	81	DLG	138	DLG	184	DLG
23	ENH	82	DLG	139	DLG	184-N	DLG
24	ENH	83	DLG	140	DLG	185	DLG
25	ENH	84	ENH	141	ENH	186	DLG
26	ENH	85	DLG	142	ENH	186-W	DLG
27	ENH	86	DLG	143	ENH	187	DIG
28	DLG	87	DLG	144	DLG	187-E	DIG
29	ENH	88	ENH	145	DIG	188	DIG
30	ENH	89	DLG	146	DLG	188-E	DIG
31	ENH	90	ENH	147	DLG	188-S	DIG
32	ENH	91	ENH	148	DLG	188-SE	DIG
33	ENH	92	DLG	149	DLG	189	DLG
34	DLG	93	DLG	150	DLG		
35	ENH	94	ENH	151	DLG		
36	ENH	95	DLG	152	DLG		
37	ENH	96	DLG	153	ENH		
38	ENH	97	ENH	154	ENH		
39	ENH	98	ENH	155	ENH		
40	ENH	99	ENH	156	DLG		
41	ENH	100	ENH	157	DIG		
42	ENH	101	ENH	158	DIG		
43	ENH	102	DLG	158-S	DIG		
44	ENH	103	DLG	158-S	ENH		
45	ENH	104	ENH	159-E	DLG		
46	ENH	105	ENH	159-W	DLG		
47	DLG	106	ENH	160	DLG		
48	ENH	107	ENH	161	DLG		
49	ENH	108	ENH	161-E	DLG		
50	ENH	109	DLG	162	DLG		
51	ENH	110	ENH	163	DLG		
52	ENH	111	DLG	164	DLG		
53	DLG	112	DLG	165	DLG		
54	ENH	113	ENH	166	DIG		
55	ENH	114	ENH	167	DIG		
56	ENH	115	ENH	168-E	DLG		
57	ENH	116	ENH	168-W	DLG		
58	ENH	117	ENH	169	DLG		
59	DLG	118	ENH	170	DLG		

Coastline (1:25,000) Datalayer
April 1992

OVERVIEW

MassGIS has modified the USGS 1:24,000 Hydrography Digital Line Graph (DLG) quadrangle files to produce the Massachusetts coastline. The coast is maintained as 84 separate quadrangles of coast, each identified by **CST<QUAD-ID>**. Please refer to the list of *USGS 1:24,000 quadrangles* for quadrangle names and numbers. The list is attached to the end of this document.

PRODUCTION

MassGIS reformatted the DLG files into ARC/INFO coverages and projected them into the Mass. State Plane Coordinate system. The coastline was then extracted from the files and edited. Polygon topology was also created for each quadrangle.

ATTRIBUTES

The **Coverage-ID** for each CST<QUAD-ID>.AAT is coded.

CST<QUAD-ID>-ID	DEFINITION
0	Quadrangle boundary
-99999	State boundary
-1	Non-geographic feature
any other number	Coastline

NOTE: Due to the complexity of the coverages, some polygons were split. The lines used to split polygons are coded -1 and represent no geographic feature.

The **Coverage-ID** for each CST<QUAD-ID>.PAT is also coded.

CST<QUAD-ID>-ID	DEFINITION
1	Land
2	Water
3	Land; Represents areas outside of Massachusetts

EDITING

Checkplots were produced and compared to the paper 1:25,000 quads. Some digital quads were not available from the USGS at the time of production. Those quads were hand digitized. All quads were snapped to adjacent quads to ensure a continuous coastline.

To best serve the most users, the coastline was determined to end at the first dam from the mouth of a river. In the instances where no dam was evident on the DLGs, the coastal coverage was ended 4 quadrangles in from the shore. This technique was used for the Merrimack, Neponset and Taunton Rivers.

MAINTENANCE

This datalayer is being maintained by MassGIS. Any corrections may be forwarded to us and will be catalogued for future updates.

PRICE: $25 per quad, with a minimum order of 2 quads for $50.

Land Use Datalayer
March 1990

OVERVIEW

The MassGIS statewide 1:25,000 1985 land use datalayer has 21 land use classifications interpreted from 1:25,000 1985 aerial photography. 1971 classifications are also imbedded in the database. This datalayer is stored in individual community coverages.

PRODUCTION

Photointerpretation and automation was done by the Resource Mapping Project at the University of Massachusetts, Amherst. The RMP staff aggregated the 104 classes of their original 1971 interpretation into 21 categories and digitized the data into individual community digital coverages using a PC version of Arc/Info software. The RMP staff then visually compared the 1971 photography and 1985 photography and produced a digital map of only 1971-85 **change** for each community. Interpretation was made from 1:40,000 9"x 9" color infrared photos flown in Summer 1985. Southeastern Mass was flown in September 1984. The flight and photography was funded by the Massachusetts Dept. of Environmental Management for another project.

PROCESSING

MassGIS used the mainframe version of ARC/INFO to combine the 1971 and 1985 change datalayers to produce a third datalayer- 1985 land use, and two related databases: LU85-<TOWN-ID>.PAT and LU85-<TOWN-ID>.FRQ.

One database is the standard ARC/INFO Polygon Attribute Table (**.PAT**).
The **LU85-<TOWN>.PAT** record for each land use polygon includes the following ITEMS:

AREA-ACRES	
LUNUM	land use code for 1971
CHNUM	1971-85 change code
LU-1985	land use code for 1985

A frequency database (**LU85-<TOWN-ID>.FRQ**) is also created. This aggregates the acreage statistics into community-wide totals.

The process of combining the two datalayers created some 'sliver polygons'. These result when a theoretically coterminous line in each coverage is actually offset due to it having been digitized twice, e.g. the shore of a lake. Many of these slivers have been eliminated by screening for an area/perimeter ratio beyond normal limits. Some slivers remain. They have the correct coding, but should actually be merged with an adjacent polygon.

The community code numbers are an alphabetically ordered list of the 351 communities in Massachusetts (See Appendix).

LAND USE CODE DEFINITIONS

CODE	ABBREV	CATEGORY	DEFINITION
1	AC	Cropland	Intensive agriculture
2	AP	Pasture	Extensive agriculture
3	F	Forest	Forest
4	FW	Wetland	Nonforested freshwater wetland
5	M	Mining	Sand, gravel & rock
6	O	Open Land	Abandoned agriculture, power lines, areas of no vegetation
7	RP	Participation Recreation	Golf, Tennis, Playgrounds, Skiing
8	RS	Spectator Recreation	Stadiums, Racetracks, Fairgrounds, Drive-ins
9	RW	Water Based Recreation	Beaches, Marinas Swimming pools
10	R0	Residential	Multi-family
11	R1	Residential	Smaller than 1/4 acre lots
12	R2	Residential	1/4 - 1/2 acre lots
13	R3	Residential	Larger than 1/2 acre lots
14	SW	Salt Wetland	Salt Marsh
15	UC	Commercial	General urban, shopping center
16	UI	Industrial	Light & heavy industry
17	UO	Urban Open	Parks, cemeteries, public & institutional greenspace, also vacant undeveloped land
18	UT	Transportation	Airports, Docks, Divided Hwy Freight storage, Railroads
19	UW	Waste Disposal	Landfills, sewage lagoons
20	W	Water	Fresh Water,Coastal Embayment
21	WP	Woody Perennial	Orchard,Nursery,Cranberry Bog
22	No Change		

Several additional categories of land use were added for parts of Massachusetts. The communities in the **Southeastern Regional Planning & Economic Development District** (SRPEDD) west of Buzzards Bay have a total of 28 land use classes. They have the same 22 categories mentioned above except that #14 is marina, not salt wetland. Additions:

CODE	ABBREV	CATEGORY
14	RM	Marinas (part of #9 in the rest of the state)
23	CB	Cranberry bog (part of #21)
24	PL	Powerlines (part of #6)
25	RSB	Saltwater sandy beach (part of #9)
26	RG	Golf (part of #7)
27	TSM	Tidal salt marshes (part of #14)
28	ISM	Irregularly flooded salt marshes (part of #14)

The .PAT for these communities has the same 4 ITEMS mentioned above and 2 additional ITEMS:

LUNUM28 28 land use codes for 1971
LU28-1985 28 land use codes for 1985

In this manner, data can be displayed with either 28 or 22 classes, depending upon whether statewide consistency or maximum detail is required.

In 1990, Cape Cod Commission funded the an update of Cape Cod. These data are also categorized into 26 land use classifications. The communities on **Cape Cod** have a total of 26 land use classes. They have the core 22 (see above). The four additional categories are:

CODE	ABBREV	CATEGORY
23	CB	Cranberry bog (part of #21)
26	RG	Golf (part of #7)
29	RM	Marina (part of #9)
30	-	New Ocean (areas of accretion)

Additional items LUNUM-CP, and LU-CP-1985 have also been added to the Cape Cod communities. Again, depending on user needs, data can be displayed in the standard 22 classes, or in 26 classes depending on user needs.

All land use categories were aggregated from 104 categories originally defined in 1971. Further information on them can be obtained from Professor William MacConnell at the Dept. of Forestry, University of Massachusetts, Amherst.

EDITING

Each land use coverage was plotted at a scale of 1:25,000 by the RMP before delivery to MassGIS.

MAINTENANCE

Remotely sensed land use cannot be expected to be interpreted with 100% accuracy. A datalayer notebook is being maintained by MassGIS. Any updates or corrections sent to MassGIS will be recorded, and datalayer modifications will be made as required.

NOTE: This project was funded by the Massachusetts Executive Office of Environmental Affairs, the Massachusetts Dept. of Public Works, and several regional planing agencies. Photointerpretation and digitizing was completed by the Resource Mapping Project (RMP) of the U. Mass. Dept. of Forestry. The MassGIS Project provides project management and data processing.

PRICE: $100 per community.

Major Drainage Basins Datalayer
March 1990

OVERVIEW

The MassGIS Project has produced a statewide digital datalayer of the 28 major drainage basins of Massachusetts as defined by the USGS Water Resources Division and the Mass Water Resources Commission. The datalayer is called **MAJ-BAS**. It contains 885 arcs and 82,000 vertices. It is stored as a single statewide coverage.

MANUSCRIPT

A set of 1:24,000 USGS paper quad sheets was carefully delineated with approximately 1800 minor or sub- drainage basins. This work was produced over the past 20 years by the USGS-WRD. Generally, the contours on the quads are the primary guide to basin boundaries. Often the 'mouth' of a basin is marked at the site of a stream gauging station, which can be different from the strict geographic location of the mouth.

METHODOLOGY

The major basins were produced from the sub-basins using the Arc/Info Dissolve command. This removed all lines except boundaries between major basins. This was possible because the Major Basin # is encrypted in the Sub-Basin-ID

The resulting Massachusetts internal major basin boundaries were then Appended to the state outline and shoreline, and processed to result in a statewide polygon datalayer, which is a digital facsimile of the Massachusetts Water Resources Commission official Massachusetts Drainage Basins Map.

All sub-basins on the manuscripts were automated (refer to SUB-BASINS Datalayer description). Due to good manuscript quality, including the visual edgematching of the 189 sheets, digitizing and edgematching was straightforward, in spite of the paper manuscripts. The manuscript author was consulted on the minor errors and ambiguities that were discovered.

ATTRIBUTES

The **MAJ-BAS.PAT** contains 260 polygons because of the many coastal islands. The MAJ-BAS.PAT (Polygon Attribute Table) contains several items in addition to the standard Arc/Info .PAT:

SQ. MILE	of each polygon
AREA-ACRES	of each polygon
BAS-ID	maj-bas numbers 1 to 28
NAME	each major basin has a name

KEY TO THE MAJOR BASIN NUMBERING SYSTEM

BASIN #	BASIN NAME
1	Hudson
2	Housatonic
3	Deerfield
4	Westfield
5	Farmington
6	Connecticut
7	Millers
8	Chicopee
9	Quinebaug
10	French
11	Nashua
12	Blackstone
13	Merrimack
14	Concord
15	Shawsheen
16	Parker
17	Ipswich
18	North Coastal
19	Boston Harbor
20	Charles
21	South Coastal
22	Cape Cod
23	Islands
24	Buzzards Bay
25	Taunton
26	Narragansett Bay & Mt. Hope Bay Shore
27	Ten Mile
28	Massachusetts Coastal

The Major Basin.AAT contains an item called OUTLINE. This enables the state border and shoreline to be differentiated from interior lines. This enables a different line type to be used for the outline of the state.

Basin names exist in two different annolevels. Annolevel 1 uses **Textset Carto** and Annolevel 2 uses **Textset Plotter**.

EDITING

Each panel was plotted at 1:48,000 and compared to the digitizing manuscript.

MAINTENANCE

A datalayer notebook is being maintained by the MassGIS. Any updates or corrections sent to MassGIS will be recorded, and datalayer modifications will be made as required.

FEE: $100.

Drainage Subbasins Datalayer
April 1993

OVERVIEW

The MassGIS Project has produced a statewide digital datalayer of the approximately 1800 sub-basins as defined and used by the USGS Water Resources Division and the Mass Water Resources Commission for various projects. These are the sub-basins that were aggregated together to make the 28 basins of the Major Basins Datalayer. The sub-basin datalayer is stored in four panels which are aggregated major basins- WEST, MID, EAST, SE (see map). Cape Cod and the Islands do not have much lateral 'surface' drainage because the soils are so porous. The sub-basin line shown for Cape Cod is the approximate groundwater divide between Cape Cod Bay, Vineyard Sound, and the Atlantic Ocean, taken from sub-surface groundwater contours. The state coastline and boundaries are included in the sub-basin coverages and are differentiated by arc attributes.

MANUSCRIPT

A set of 1:24,000 USGS paper quad sheets were delineated into approximately 2200 minor or drainage sub-basins. This work was produced over the past 20 years mainly by the USGS-WRD. Generally, the contours on the quads are the primary guide to basin boundaries. Often the 'mouth' of a basin is marked at the site of a stream gaging station, which can be different from the strict geographic location of the mouth.

METHODOLOGY

All sub-basins on the manuscripts were automated. Due to good manuscript quality, including the visual edgematching of the 189 sheets, digitizing and edgematching was straightforward, in spite of the paper manuscripts. The manuscript author was consulted on the minor errors and ambiguities that were discovered.

In the fall of 1992 the Mass Department of Environmental Protection Division of Water Supply added the state boundary and 100K coastline and extended or clipped the sub-basins to meet them. Additional drainage basins were delineated at the intake points of public water supplies. These additional basins are identified by arc attributes different from the original sub-basins but were given unique sub-basin ids. From these additional basins all upstream basins were coded as contributing to a surface public water supply. DEP regional staff determined which water supplies were primary and which were emergency or backup supplies, and the MDC provided the basins covered by MDC/MWRA jurisdiction. These basins were compared against the Massachusetts Surface Water Quality Standards of 1990 to determine which basins were designated as containing Outstanding Resource Waters (ORW). An ORW is designated as those waters including public water supplies, designated for protection under 314CMR 4.04(3), Massachusetts Surface Water Quality Standards - Protection of Outstanding Resource Waters. Please note that other areas may be included in the delineation of ORW's in addition to the sub basins.

ATTRIBUTES

Each sub-drainage basin has a unique 5 digit SUB-ID number that was derived from the numbering system on the manuscripts. The numbers are roughly hierarchically ordered based on the sub-basins position within the major basin. The ID-numbers ascend as the water descends. The first two numbers in the 5 digit code identify the 28 major basins as numbered in Massachusetts (see listing in the Major Basins Datalayer Description). This 2 digit code is duplicated in the **(redefined) MAJ-BAS** ITEM. The last three numbers in the **SUB-ID** are duplicated in the **(redefined) POSITION** ITEM. Offshore islands are given a **SUB-ID** of ##999 where ## is the nearest onshore **MAJ-BAS** id. The attribute for

Outstanding Resource Water designation is **ORW**, which is coded as follows:

ORW	ORW DESCRIPTION
1	ORW contributing area of a public surface water supply
2	Other ORW area (ACEC, protected stream, etc.)

The surface Water supply attribute, **WSP** is coded as follows:

WSP	BASIN DESIGNATION
1	Surface Water Supply Watershed
2	Emergency/Backup Surface Water Supply Watershed
3	Adjacent State Surface Water Supply Watershed(incomplete)
4	MDC/MWRA Watershed

The arcs are coded with the two digit attribute **LINE-ID**, which identifies the type of boundary the line represents:

LINE-ID	LINE TYPE
0	Sub-Basin Boundary
1	Major Basin Boundary
2	Coastline or State Boundary
5	Public Water Supply Sub-Basin Boundary

EDITING

The entire datalayer was plotted at 1:100,000, selected areas at 1:25,000. Edgematching was done. The manuscript often had more than 1 ID per sub-basin. One was chosen by MassGIS. The ORW designation was plotted and checked by DEP Wetlands staff. The water supply designation was plotted and checked by DEP regional staff.

MAINTENANCE

A datalayer notebook is being maintained by the MassGIS. Any updates or corrections sent to MassGIS will be recorded, and datalayer modifications will be made as required.

PRICE: $150 per panel.

Aquifers Datalayer
March 1990

OVERVIEW

MassGIS has produced an aquifer datalayer composed of 20 individual panels, generally based on the boundaries of the major drainage basins. Areas of high and medium yield are mapped. The panels are called **AQ-<BASIN>**. See attached list of panel names.

MANUSCRIPT

The USGS 1:48,000 hydrologic atlas series on groundwater favorability has been produced for all of Massachusetts. The basemaps for these were photographically reduced and spliced together from 1:24,000 USGS quadrangles. Each manuscript covers one of the major drainage basins. They have been individually researched and published by the USGS-WRD starting in the 1960's and continuing to the present. A couple have been compiled but not yet published. In these cases the draft manuscripts were automated.

The definition of high and medium yield varies between panels, as it does on the source manuscripts. For example, AQ-CONCORD defines medium yield as between 100 and 300 GPM (gallons per minute), while AQ-CONNECTICUT defines medium as 25-1000 GPM. Most of the panels have definitions close to or the same as AQ-CONCORD. See each panel documentation for the precise definitions.

The USGS manuscripts were not edgematched to adjacent panels.

PRODUCTION

The high and medium yield categories were automated from the manuscripts. The major drainage basin boundary was copied from the **MAJ-BAS** coverage to use as a template for digitizing. Because ponds and lakes are also closely related to aquifers, they were clipped from the ponds datalayer and also used as a template. No attempt has been made to resolve interpretation inconsistencies between panels.

ATTRIBUTES

Both a polygon attribute table (**.PAT**) and an arc attribute table (**.AAT**) were created for each aquifer panel. The AAT has one item called OUTLINE. The drainage basin boundary is coded as '1'. All other arcs are coded as '0'.

The **AQ-<basin>.PAT** has the following ITEMS:

CODE	1=pond, 2=high yield, 3=medium yield
TYPE	character values the equivalent of the CODE item
YIELD	yield per minute for the aquifer classes
TRANSMISSIVITY	square feet per day
AREA-ACRES	area in acres of each polygon

EDITING

Plots of each panel were made at a scale of 1:48,000 and compared to the source map. Corrections were made as needed.

MAINTENANCE

A datalayer notebook is being maintained by the MassGIS. Any updates or corrections sent to MassGIS will be recorded, and datalayer modifications will be made as required.

AQUIFER DATALAYER PANEL NAMES

AQ-BLACKSTONE
AQ-BOS-MYSTIC (Includes coastal North Shore)
AQ-BOS-WWN (Weymouth, Weir, Neponset)
AQ-BUZZARDS
AQ-CHARLES
AQ-CHICOPEE
AQ-CONCORD
AQ-CONN (Connecticut)
AQ-DEERFIELD
AQ-FRENCH-QUIN (French, Quinebaug)
AQ-HOOSIC
AQ-HOUSATONIC
AQ-IPSWICH
AQ-ISLANDS (Marthas Vineyard & Nantucket)
AQ-MERRIMACK
AQ-MILLERS
AQ-NARR-HOPE (Narragansett & Mt. Hope Bay)
AQ-NASHUA
AQ-PARKER
AQ-SCOAST
AQ-SHAWSHEEN
AQ-TAUNTON
AQ-TENMILE
AQ-WEST-FARM (Westfield, Farmington)
AQ-WEWEANTIC (parts of Buzzards Bay & South Coast)

FEE: $100. per panel.

EPA Designated Sole Source Aquifers Datalayer
February 1991

OVERVIEW

The Sole Source Aquifer datalayer was compiled by the Department of Environmental Protection (DEP) Division of Water Supply (DWS). Five Sole Source Aquifers have been designated by the US Environmental Protection Agency (EPA) for Massachusetts. The Sole Source Aquifers are stored as a statewide polygon coverage, **SSA**. A Sole Source Aquifer (SSA) is an aquifer designated by US EPA as the 'sole or principal source' of drinking water for a given aquifer service area; that is, an aquifer which is needed to supply 50% or more of the drinking water for that area and for which there are no reasonably available alternative sources should that aquifer become contaminated.

MANUSCRIPT

The Neponset SSA was obtained in digital format from US EPA Region 1, while the Plymouth-Carver SSA was digitized from a source map at DEP. The other SSAs were reselected from MassGIS's Towns coverage, because whole towns and shorelines defined those SSAs.

METHODOLOGY

With the PROJECTION command the Neponset SSA was projected from a UTM coverage to one in State Plane Feet. The Plymouth-Carver SSA was simply imported from the DEP-DWS pcARC/INFO. Then, with a RESELECT command the other 3 SSAs: Martha's Vineyard, Nantucket and Cape Cod were obtained. Finally, the SSAs were combined into a single coverage. A checkplot was then submitted to US EPA for verification.

ATTRIBUTES

This datalayer has a **.PAT** with the following attributes associated with each polygon:

SSA_NUM	a unique id for each SSA
SSA_NAME	the name of the SSA

Several small waterbodies also are found within this coverage. These have been coded with a SSA_NAME of 'WATERBODY'.

MAINTENANCE

The DEP Division of Water Supply is maintaining this datalayer.

PRICE: $50.

DEP Approved Zone IIs Datalayer
April 1993

OVERVIEW

The Department of Environmental Protection (DEP) approved Zone IIs data layer was compiled by the DEP Division of Water Supply (DWS). The database contains 143 Zone IIs statewide. The Zone IIs are stored as a polygon coverage, ZONE2_APPRV, and an attribute table, ZONE2_APPRV.SHR is to be used in conjunction with the coverage.

As stated in 310 CMR 22.02, a Zone II is

> 'that area of an aquifer which contributes water to a well under the most severe pumping and recharge conditions that can be realistically anticipated (180 days of pumping at safe yield, with no recharge from precipitation). It is bounded by the groundwater divides which result from pumping the well and by the contact of the aquifer with less permeable materials such as till or bedrock. In some cases, streams or lakes may act as recharge boundaries. In all cases, Zone IIs shall extend up gradient to its point of intersection with prevailing hydrogeologic boundaries (a groundwater flow divide, a contact with till or bedrock, or a recharge boundary).'

These data are used in association with the Public Water Supplies data layer. The following describes certain unique features of this association.

- Any proposed new well which will pump at least 100,000 gallons per day must have a Zone II delineation completed and approved by DEP prior to the well coming on line. In such an instance, a Zone II may **not** have an installed well point associated with it because the information for Zone II delineation was derived **from test wells** and the pumping wells await approval before installation.

- Additionally, a new source may not be on-line yet, but **other, older wells** may fall within its Zone II boundary. In other words, some wells 'within' a Zone II may **not** have been used to delineate that Zone II.

- Further, existing wells must have a Zone II delineated as a condition of receiving a water withdrawal permit under the Water Management Act.

Interim Wellhead Protection Areas:

In the absence of a DEP approved Zone II for any well, DEP has adopted the 1/2 mile Interim Wellhead Protection Area, or Interim Zone II, as the primary recharge area for that well. These 1/2 mile Interim Wellhead Protection Areas are stored in a separate coverage called ZONE2_INTER. ZONE2_INTER contains Arc/INFO derived 1/2 mile interim wellhead protection buffers.

Zone IIs and groundwater supplies data are closely linked. In the water sources coverage CWS_DEP, an item, ZII-DEF, has been added to distinguish which wells were used to delineate **actual Zone IIs** and which ones were used to create the **interim wellhead protection areas**, and the item **ZII-NUM** links the points to the actual Zone II in this coverage. The wells requiring 1/2 mile Interim Wellhead Protection Areas were identified by selecting all sources whose TYPE is groundwater (GW) and whose ZII-DEF is **not**

'actual'. The following coding scheme applies for the item ZII-DEF in the **CWS_DEP coverage:**

ZII-DEF-Code	Description
1	Actual Zone II
2	1/2 Mile Interim Wellhead Protection Area
0	Surface Water Supply

MANUSCRIPT

The Zone IIs were recompiled onto the DEP Water Supply Protection Atlas from the final technical reports generated as a result of the following Water Supply programs:

a. Source Approval Program,
b. Zone II Technical Assistance Program,
c. Aquifer Land Acquisition Program, and
d. Water Supply Contamination Correction Program.

The Zone IIs were then digitized from the Atlas (1:25,000) by DEP-DWS staff.

METHODOLOGY

After the technical reports are reviewed for completeness, the Zone II boundaries are transferred, in pencil, to the Water Sources overlay of the Water Supply Protection Atlas housed at DEP-DWS in Boston. The Zone IIs are then inked on the overlay using a size 0 (.35 mm) technical pen. Finally the Zone IIs are digitized on the DEP-DWS PC workstation. Periodically (approximately twice a year), the Zone IIs are updated by DEP-DWS. This step involves adding, superseding and modifying the Zone IIs.

ATTRIBUTES

Polygon Attributes:
This datalayer has a **.PAT** (polygon attribute table) with the following attributes associated with the polygon of a Zone II:

ZONE2_APPRV-ID	the unique identifier of each **polygon**
AREA-ACRES	the area, in acres, of each polygon
ZII-FRQ	the number of Zone IIs sharing that polygon (several Zone IIs may overlap)

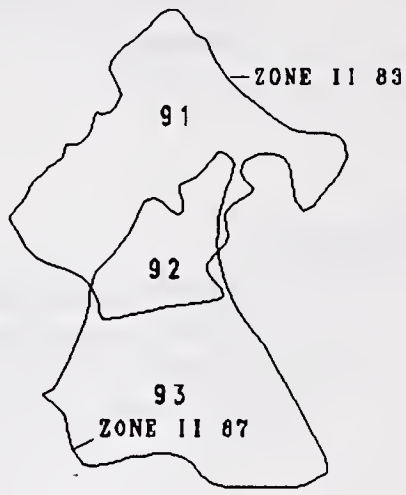
Handling Overlap:
Because wells tend to be clustered by the nature of the resource they tap, Zone IIs protecting those wells will frequently overlap. As a result, intersecting Zone IIs will be broken up into several polygons. With this overlap, more than one Zone II could share a particular polygon. Since the overlap area (polygon 92 in the illustration) may be shared by two Zone IIs, one cannot use ZONE2_APPRV-ID (the polygon identifier) to find the entire Zone II. How can one determine if that shared polygon is coded, as 'Zone II 83' **or** as 'Zone II 87'? INFO only allows for a one to one relationship to be represented, however, a one to many relationship is required.

In ARC 5.0, to handle the shared polygon problem, a second INFO file called ZONE2_APPRV.SHR was created. This second file stores the **Zone II identifier** as well as the polygon identifier (ZONE2_APPRV-ID). The items of ZONE2_APPRV.SHR include:

ZONE2_APPRV-ID	the unique id of each **polygon** (also stored in .PAT)
ZII-NUM	the unique DEP number of the **Zone II** (Zone II identifier)
NUM-POLYS	the number of polygons comprising a Zone II

The ZONE2_APPRV-ID of both these files are equal. A sample diagram of the illustrated Zone IIs is shown at right. Note how one ZONE2_APPRV-ID record for polygon 92

relates to **two** ZONE2_APPRV-ID records in ZONE2_APPR.SHR (see arrows below). Also, note how in order to 'see' **all** of "ZONE II 83" one must be able to select **both** polygon ZONE2_APPRV-ID 91 **and** polygon ZONE2_APPRV-ID 92. ARC 6.0 handles this one-to-many relationship much more smoothly.



ZONE2-APPRV.PAT				ZONE2_APPRV.SHR		
ZONE2_ APPRV-ID POLYS	AREA- ACRES	ZII- NUM- FRQ		ZONE2_ APPRV-ID	ZII- NUM	
91		479	1	**91**	**83**	2
92		165	2 ---------->	**92**	**83**	2
93		480	1 -------->	92	87	2
				93	87	2

Since the ZONE2_APPRV-ID are both equal in both files, a one-to-many relate can be executed. A relate is performed on ZONE2_APPRV.SHR using ZONE2_APPRV-ID to reselect a Zone II based on **ZII-NUM**.

Arc Attributes:

ZONE2_APPRV also has line topology and an **.AAT** (arc attribute table) with items:

ZONE2_APPRV-ID	the unique id of the **arcs** of the Zone II
ZII-NUM	the number of the Zone II as recorded by DEP DWS Technical Services to identify each Zone IIs

These two numbers are equal to each other and **ZII-NUM** has the same value as **ZII-NUM** in the table ZONE2_APPR.SHR. In order to select all **arcs** composing a single Zone II one can use the .AAT item **ZII-NUM**.

****** NOTE ******

The **ZII-NUM** item is found in the Community Public Water Supplies datalayer .PAT. Thus, the wells that were used to delineate a particular Zone II may be identified.

The **ZII-NUM** also corresponds to a specific DEP DWS Technical Services document that references the Zone II back to its hard-copy report which contained the source manuscript. It is strongly suggested that if ZONE_IIS are to be used for any local level work, the original documents, located at DEP's Boston Office, be referred to for critical, site specific information.

MAINTENANCE

The Department of Environmental Protection, Division of Water Supply is maintaining this datalayer. Comments or questions can be referred to DEP-DWS at 617-556-1115.

Price: $100 for both approved and interim Zone II coverages

Community Public Water Supplies Datalayer
April 1993

OVERVIEW

The Community Public Water Supplies datalayer was compiled by the DEP Division of Water Supply. It is distinct from the 'Public Water Supplies' datalayer, PWS-2-90, (see 'Public Water Supplies' documentation). The community public water supply database contains 1435 public community water supplies as defined in 310 CMR 22.00. Both ground water and surface water supplies are included. The data is stored as a statewide point coverage, **CWS_DEP**.

As stated in 310 CMR 22.00, a COMMUNITY WATER SUPPLY is part of a community water system "which serves at least fifteen (15) service connections used by year-round residents or regularly serves at least twenty-five (25) year-round residents". This information has been maintained by DEP-DWS on a Water Supply Protection Atlas since 1981.

Please note: Non-community public water supplies as defined in 310 CMR 22.00 and the federal Safe Drinking Water Act are NOT included in this coverage. Examples of non-community water supplies include schools, factories and restaurants.

MANUSCRIPT

The community water supply locations were digitized from the DEP Water Supply Protection Atlas (1:25,000) maintained by DEP-DWS Technical Services.

METHODOLOGY

Quad-scale checkplots of PWS-2-90 (USGS data) were made of the entire state. The checkplots were compared to the Water Supply Protection Atlas overlays housed at DEP-DWS Boston. Supplies were matched, moved, added or deleted with a digitizer. Of the 1585 public community water supplies, 1028 sources appeared both in DEP and USGS data. Most of these water supplies were field verified by USGS-WRD. All other locations were verified in the office by Regional and Boston DWS staff, using maps and other DEP information sources. Attribute data was input from the Division of Water Supplies Public Water Supplies Database. Sources that are not currently approved by DEP may be included in this datalayer for reference purposes. For USGS data description, please see the 'Public Water Supplies' datalayer documentation.

ATTRIBUTES

This datalayer has a **.PAT** (point attribute table) with the following attributes associated with each community public water supply:

STNAME	name of public water supplier
PWSID	DEP public water supplier identification number
SOURCE-ID	an 11 digit DEP code to identify the water supply source
SOURCE-NAME	the DEP name for the water supply source
SITE-NAME	the USGS name for water supply source, if no USGS name then a name is given for identification purposes
USGS-ID	a 15 digit ID# combining lat. & long and a 2 digit code for multiple supplies at one site
TYPE	GW = groundwater, SW = surface water, SD = distribution reservoir, CW = closed well, PW = proposed well, HW = historic well, PS = proposed surface water, CS = closed surface water, HS = historic surface water
LATITUDE	
LONGITUDE	
SOURCECHK	FC = field checked, OC = office checked, U = unchecked, GP = GPS surveyed
ZII-DEF	indicates whether the source was used to define a DEP approved Zone II (1 = defined)
ZII-NUM	GIS number of Zone II associated with this well. This corresponds to the arc attribute **ZII-NUM** and the polygon attribute **ZII-NUM** in the .SHR file. See the description of the Zone II datalayer.
TO-APPR	indicates wells approved through New Source Approval process still awaiting permanent construction. (1 = waiting)
GPM	yield in gallons per minute, currently only 0 or 70 where 0 means less than 70 gpm and 70 means more than 70 gpm
** redefined **	
REGION	the DEP region in which the supply is located, this is the first digit of the source-id

The SOURCE-ID will represent a well, wellfield, pumping station, or surface water withdrawal point source. In some instances the USGS data coverage will show a tightly grouped cluster of wells, but CWS-DEP will reflect only the location of the pumping station. Historically, SOURCE-IDS were assigned to established water quality sampling locations. If a pumping station was the sampling point for a group of wells, it was assigned the SOURCE-ID, but if the individual well was sampled, the SOURCE-ID was given to the well. The Community Water Supplies coverage includes USGS data.

Information on the status of water supplies is not maintained in this datalayer. A historical source designates a test well or permanently off-line surface source that would require a new source approval to resume production, while a closed source is considered permanently off-line, either destroyed or filled. Be advised that at any time any of the sources may be off-line for many reasons, no inference is made as to the condition of these sources, please contact the appropriate water company for the latest status.

MAINTENANCE

The Department of Environmental Protection, Division of Water Supply is maintaining this datalayer.

PRICE: $100.

Protected and Recreational Open Space Datalayer
April 1993

OVERVIEW

The protected and recreational open space datalayer contains the parcels boundaries of conservation lands *and* recreational facilities in Massachusetts. The associated database contains a wealth of information about each parcel, including ownership, level of protection, public accessibility, and activities occurring at each site. Federal, state, county, municipal, nonprofit and private lands are all included in this datalayer.

The datalayer is panelled into 14 county coverages and is undergoing significant updates in 1993. This update effort, coordinated by MassGIS, involves over 150 volunteers from state environmental agencies, local watershed associations, town conservation commissions, municipal planning and engineering departments, local and regional nonprofits, and many others. The most significant change from our previous open space datalayer is the addition of municipal conservation lands and recreational facilities. This datalayer is being completely integrated with the 1993 update of the Statewide Comprehensive Outdoor Recreation Plan (SCORP) inventory. All attribute data will eventually be maintained in an ORACLE database, linked to the GIS coverages through a unique identifier called the OS_ID.

This datalayer is currently under development and as such is constantly changing. It is not expected to reach a final production stage until late 1993 or early 1994. However, it is available for use in a limited way. The attribute datalayer, while comprehensive in scope, is not complete for all parcels and will not be complete for some time, even after the geographic data are substantially complete.

The following types of land are included in this datalayer:

conservation land	- habitat protection with minimal recreation, such as walking trails
recreation land	- outdoor facilities such as town parks, commons, playing fields, school fields, golf courses, bike paths, scout camps, and fish and game clubs; and indoor recreational facilities, such as swimming pools. These may be privately or publicly owned facilities.
town forests	
parkways	- green buffers along roads, as long as they are a recognized conservation resource
agricultural land	- land protected under an Agricultural Protection Restriction (APR)
aquifer protection land	
watershed protection land	
fire districts	
cemeteries	

Also included as an option are Chapter 61 type lands (61 = Forestry; 61A = Agriculture; 61B = Recreation). These parcel boundaries will *not* be maintained over time but are of great interest and usefulness to some towns for future planning purposes.

ORIGINAL SOURCE MANUSCRIPTS and ORIGINAL PRODUCTION

This datalayer is an enhancement of our previous open space datalayer of state and federal lands originally compiled in 1988 from 1:25,000 scale maps maintained by each of the agencies of the Executive Office of Environmental Affairs (EOEA) and the Massachusetts Audubon Society (MAS).

Each agency maintains its own maps according to its own standard operating procedures and the accuracy of these maps varies. Some of the parcels were drafted onto USGS quadrangles from detailed surveys, while in other cases the exact property boundary is not

known. The compilation process that produced a unified manuscript faithfully reproduced the property boundaries as represented on the agencies' maps. The data are very useful for most statewide and regional planning purposes. However, the state and federal lands coverage is not a legal record of ownership, and the user should understand that the parcel representations are generally not based on property surveys.

The DFWELE cartographer then compiled onto this manuscript the land holdings of the National Park Service (NPS), US Fish & Wildlife Service (USFWS), and The Trustees of Reservations (TTOR, incomplete). Updating of this coverage began in the fall of 1989 and is ongoing as of 1993.

Also included in the original open space datalayer were some community and local lands within Berkshire and Essex Counties and the Nashua River Basin. The production methodology varied subtly by region. Compilation of open space holdings in Essex County had already been done by the Essex County Greenbelt Association (ECGA), and these 1:25,000 scale maps were used as the manuscript for Essex County. Manuscripts for Berkshire County were compiled by the Berkshire County Cooperative Extension Service in cooperation with town assessors, conservation commissions, and local land trusts. Manuscripts for the Nashua River Basin were prepared jointly by DFWELE and the Department of Food and Agriculture (DFA) from town assessors maps.

All manuscripts for each of the coverages were reviewed by DFWELE. The manuscripts were then digitized by the Department of Regional Planning and Landscape Architecture, University of Massachusetts at Amherst. Checkplots were produced and reviewed by the DFWELE cartographer for precision. A digital database was prepared by DFWELE with a record for each polygon in the coverage.

CURRENT SOURCE MANUSCRIPTS and PRODUCTION METHODOLOGY

The original open space datalayer consisted of 6 regional panels. All of the existing information (both geographic and attribute) was maintained in the new panelling scheme (14 county panels) and is now being enhanced. The addition of local lands to this datalayer is relying almost solely on volunteer involvement at the local level, consequently the data are variable in their accuracy and completeness. Geographic data sources are predominantly town tax assessors maps and existing open space plans. In the majority of cases these maps have been recompiled onto a 1:25,000 basemap provided to the volunteers by MassGIS. The data are then digitized from these basemaps, which contain registration points. In a very few cases data may be digitized from the volunteer's own map if it meets minimum digitizing requirements. Occasionally data are also pulled into the coverage from pre-existing digital datalayers provided by the towns or from other state agency coverages. All polygons bordering a road, stream, pond, town boundary, or coastline are snapped to that feature. If the original data are better than the 1:25,000 base, we are maintaining a separate copy of this data. We are also tracking source information and we are flagging completeness of attribute information on a polygon by polygon basis.

ATTRIBUTES

Currently all attribute information is maintained in Arc/Info in a PAT. Migration of these data to ORACLE is scheduled for mid-1993. At that time the GIS attribute data will be merged with the updated SCORP data and in many cases there will be additional information available for each polygon, including the level of public access to a site (including transportation options), and the types of facilities and activities at each site. Enhancements to the attribute database also include historical tracking of source manuscripts as changes are made to existing polygons, and the ability to track multiple ownerships, other legal interests, management interests and funding interests related to a single polygon.

DATAFILE NAME: OS-<COUNTY>.PAT
45 ITEMS: STARTING IN POSITION 1

COL	ITEM NAME	WDTH	OPUT	TYP	N.DEC	CONTENTS
1	AREA	4	12	F	3	
5	PERIMETER	4	12	F	3	
9	OS-<COUNTY>#	4	5	B	0	
13	OS-<COUNTY>-ID	4	5	B	0	
17	OLD-OS-ID	4	5	B	0	For 1988 OS compilation
21	COUNTY_CODE	2	2	I	-	
23	POLY-ID	5	5	I	-	unique value within each county
28	SCORP_ID	6	6	I	-	link to 1987 SCORP data
34	FEE_OWNER	20	20	C	-	
54	STATUS_FEE_OWNER	1	1	C	-	
55	MANAGER	20	20	C	-	
75	INT_MANAGER	4	4	C	-	
79	STATUS_MANAGER	1	1	C	-	
80	OTHER_1	20	20	C	-	Other legal interests
100	INT_1	4	4	C	-	"
104	STATUS_1	1	1	C	-	"
105	OTHER_2	20	20	C	-	"
125	INT_2	4	4	C	-	"
129	STATUS_2	1	1	C	-	"
130	OTHER_3	20	20	C	-	"
150	INT_3	4	4	C	-	"
154	STATUS_3	1	1	C	-	"
155	SITE_NAME	30	30	C	-	
185	SRC_MAP_REF	4	4	I	-	Table with source map attributes
189	AREA_ACRES	9	9	N	2	Calc. by GIS
198	ASSESS_ACRES	9	9	N	2	Calc. by tax assessor
207	DEED_ACRES	9	9	N	2	
216	FY_FUNDING	4	4	I	-	state properties only
220	CAL_YR_REC	4	4	I	-	all properties
224	PRIMARY_PURP	1	1	C	-	primary purpose
225	PUB_ACCESS	1	1	C	-	public access
226	LEV_PROT	1	1	C	-	level of protection
227	OS_DEED_BOOK	4	4	I	-	
231	OS_DEED_PAGE	4	4	I	-	
235	TOWN-ID	3	3	I	-	
238	ASSESS_MAP	5	5	C	-	Assessors' map information
243	ASSESS_BLK	5	5	C	-	"
248	ASSESS_LOT	5	5	C	-	"
253	ASSESS_SUBLOT	5	5	C	-	"
258	COMMENTS	60	60	C	-	
318	UPDATES	1	1	C	-	
319	CH61	1	1	C	-	
320	CH61A	1	1	C	-	
321	CH61B	1	1	C	-	
322	DFWFLAG	2	2	C	-	
324	POLY-DATE	8	8	D	-	Date polygon altered
332	ATT-DATE	8	8	D	-	Date attributes altered
** REDEFINED ITEMS **						
21	OS_ID	7	8	I	-	Unique GIS Identifier; link to 1993 SCORP

See next page for various coding types.

DATALAYER MAINTENANCE

MassGIS is maintaining this datalayer. Any updates or corrections sent to MassGIS will be incorporated into the datalayer. Anyone wishing to volunteer to gather information for their town for inclusion in this datalayer should also contact MassGIS.

PRICE: $50 per County

LIST OF VALUES FOR COMPLETING THE 1993 STATEWIDE COMPREHENSIVE OUTDOOR RECREATION PLAN/OPEN SPACE INVENTORY SHEET

STATUS

F	Federal
S	State
C	County
M	Municipal
N	Nonprofit
P	Private
X	Unknown

INTERESTS

Restrictions:

CR	Conservation Restriction
APR	Agricultural Preservation
AQR	Aquifer Protection
AR	Air Rights
HPR	Historic Preservation
SE	Scenic easement
WR	Watershed Restriction (local)
WRP	Wetlands Restriction Program

Funding Sources:

ALA	Aquifer Lands Aquisition
SH	State Self-help
USH	Urban Self-help
CTC	City and Town Commons
APR	Agricultural Preservation
LWCF	Land and Water Conservation Fund
FF	Other federal funds

PUBLIC ACCESS TYPES

Public
Public (Residents only)
Public (Seasonal)
Private (Public welcome)
Private (Members Only)
None

PRIMARY PURPOSE

R General Outdoor Recreation
C Conservation
H Historical/Cultural
A Agriculture
W Water Supply Protection
S Scenic
Other (explain)

LEVEL OF PROTECTION

P In perpetuity
T Temporary
L Limited
N None

CHAPTER 61 TYPE

Chapter 61 (Forestry)
Chapter 61A (Agriculture)
Chapter 61B (Recreation)

FACILITIES

Archery/Target Shooting
Baseball/Softball
Boat Ramps
Boat Slips and Moorings
Cabins
Comfort Station
Equipment Concession Rent
Fields, Baseball/Softball
Fields, Football/Soccer
Food Concession
General, Open Recreation AreaM.
Golf Course (9 holes)
Golf Course (18 holes)
Hist/Cult/Arch Features - Significant
Natural Features - Significant
Nature Center
Picnic Tables
Playgrounds
Shelters
Skating Rinks
Ski Lifts
Spectator Bleachers
Stage/BandShell
Swimming Pools
Swimming Beach (Fresh)
Swimming Beach (Salt)
Tennis Courts
Tent Sites
Trailer Sites
Trails (Paved)
Trails (Unpaved)
Visitors Center
Volleyball Courts
Other (explain)

ACTIVITIES

ATV/4-wheeling/motorcycling
Bicycling (on road)
Bicycling (off road)
Boating (Motor)
Boating (Non-Motor)
Camping
Community Gardening
Dog Walking
Fishing (Fresh water)
Fishing (Salt water)
Horseback Riding
Hunting
Rollerblading
Skate boarding
Skating (Pond)
Skiing(X-Country)
Snowmobiling
Swimming(Pond)
Water skiing
Other (explain)

Areas of Critical Environmental Concern Datalayer
April 1993

OVERVIEW

The Areas of Critical Environmental Concern (ACEC) datalayer shows the location of areas that have been designated ACECs by the Secretary of Environmental Affairs. ACEC designation requires greater environmental review of certain kinds of proposed development under state jurisdiction within the ACEC boundaries.

The ACEC Program is administered by the Department of Environmental Management (DEM) on behalf of the Secretary of Environmental Affairs. The Massachusetts Coastal Zone Management (MCZM) Office managed the original Coastal ACEC Program from 1978 to 1993, and continues to play a key role in monitoring coastal ACECs. Procedures for ACEC designation and the general policies governing the effects of designation are contained in the ACEC regulations (301 CMR 12.00). For more information about the ACEC datalayer or about the effects of ACEC designation, contact the ACEC Program at (617) 727-3160 ext. 552 or ext. 564.

The ACEC datalayer has been compiled by MCZM and DEM and includes both coastal and inland areas. New ACEC polygons are added periodically (about 2 per year) because the program continues to evaluate and designate new ACECs. Currently the datalayer contains 22 ACECs.

MANUSCRIPT

Polygons are hand-drawn onto 1:25,000 USGS quad sheets and digitized.

ATTRIBUTES

This data layer has a .PAT with the following items:

ACECID	Unique identifier of each area
NAME	The name of the area
DES-DATE	The date the Secretary signed the designation
FEDCON-DATE	The date after which all activities requiring federal funding, licensing or permitting must be consistent with enforceable CZM program policies (for CZM ACECs only)
SECRETARY	The name of the Secretary who signed the designation
AREA-ACRES	Acreage of each polygon
ADMIN_BY	Agency responsible for the ACEC

EDITING

Boundaries were snapped to roads, drainage basins, trails, etc. depending on the item defining the edge. Where the snapcover is at a lower resolution than the USGS quad (roads, streams, etc.), data were changed to provide "relative visual accuracy."

MAINTENANCE

DEM continues to add polygons as new ACECs are designated.

Price: $50.

Natural Heritage & Endangered Species Program Priority Habitats Datalayer
April 1993

OVERVIEW

The Priority Habitats (PRI-HAB) Datalayer consists of polygons which represent estimations of the most important natural communities and state-listed rare species habitats in Massachusetts. These habitats are based on occurrence records in the Natural Heritage & Endangered Species Program's Biological and Conservation Data System database: the occurrence records are spatially represented at 1:25000 scale on the Program's series of USGS topographic maps. This data has no regulatory significance; this data is not related to the habitat provisions of the Massachusetts Endangered Species Act. This datalayer should not be confused with the Estimated Habitats of State-Listed Rare Wetlands Wildlife datalayer.

PRODUCTION

This datalayer was digitized by the Natural Heritage & Endangered Species Program (NHESP). The information was compiled on mylar overlaying 1:60000 topographic quadrangles and was digitized from that medium. Checkplots for all quadrangles were produced at 1:25000 scale. All habitats were checked for locational accuracy.

ATTRIBUTES

The Priority Habitats datalayer currently has no attributes other than those normally created in an INFO polygon attribute table. It is planned to create an item to store a name for the habitat or "site" and an item to store a biodiversity rank for the habitat.

DATALAYER MAINTENANCE

Occurrence records from the NHESP Biological and Conservation Data System database are continuously being added, modified and deleted. Those changes will be incorporated into the Priority Habitats datalayer annually. A new version of the datalayer will be produced in January each year.

AVAILABILITY

The Priority Habitats datalayer may be made available to EOEA agencies and EOEA cooperators for certain projects. Please contact NHESP at (617) 727-9194 in order to request permission for use of the datalayer. The legend which MUST accompany this datalayer on ALL maps is:

"NHESP Priority Habitats for State-Listed Rare Species <year>:
NOT for use with Wetlands Protection Act or MA Endangered Species Act."

Estimated Habitats of State-Listed Rare Wetlands Wildlife Datalayer
April 1993

OVERVIEW

The Estimated Habitats of State-Listed Rare Wetlands Wildlife (WET-HAB) Datalayer consists of polygons which represent estimations of the habitats of state-listed rare wetlands wildlife populations. These habitats are based on occurrence records in the Natural Heritage & Endangered Species Program's Biological and Conservation Data System database. These occurrences are spatially represented at 1:25000 or 1:24000 scale on the Program's series of USGS topographic maps. These estimated habitats are delineated in accordance with the Wetlands Protection Act Regulations (310 CMR 10.00). Projects which are subject to the Wetlands Protection Act and which fall within Estimated Habitats for Rare Wetlands Wildlife require the filing of a Notice of Intent form with the Natural Heritage & Endangered Species Program.

PRODUCTION

This datalayer was digitized by the Natural Heritage & Endangered Species Program (NHESP). The information was compiled on and digitized from USGS 7.5 x 7.5 minute quadrangle, topographic, maps at 1:25000 and 1:24000 scales. Polygons are checked for locational accuracy.

ATTRIBUTES

This datalayer has no attributes other than those normally created in an INFO polygon attribute table.

DATALAYER MAINTENANCE

Occurrence records from the NHESP Biological and Conservation Data System database are continuously being added, modified and deleted. Those changes are incorporated into the datalayer annually. Habitats drawn for rare wetlands wildlife occurrences that have not been reverified within the last twenty-five years are deleted annually. A new version of the datalayer is produced in January each year.

AVAILABILITY

The Estimated Habitats of State-Listed Rare Wetlands Wildlife may be made available to EOEA agencies and EOEA cooperators for certain projects. Please contact NHESP at (617) 727-9194 in order to request permission for use of the datalayer. The legend which MUST accompany this datalayer on ALL maps is:

> **"NHESP Estimated Habitats for Rare Wetlands Wildlife <year>:**
> **For use with Wetlands Protection Act ONLY"**

Estimated Habitat maps are available for viewing at local Massachusetts conservation commission offices or in the year's Atlas of Estimated Habitats for Rare Wetlands Wildlife.

DEP Permitted Solid Waste Facilities Datalayer
March 1993

OVERVIEW

The permitted solid waste facility datalayer was compiled by the Department of Environmental Protection (DEP) Division of Solid Waste Management. The datalayer contains the majority of sanitary landfills permitted or registered with DEP as of January 1991. Of the 441 polygons in the datalayer, 336 are sanitary landfills. The remainder represent transfer stations and recycling or composting facilities. The landfills are broken down into sanitary, epic (pre-1971), illegal, ash, demolition, and stump landfills. The data are stored as a statewide polygon coverage, **SW**.

Please Note: This datalayer represents solid waste landfills permitted since 1971. Not all of them are active. Numerous epic (pre-1971) and some illegal landfills are therefore not represented here. The MassGIS 1985 land-use datalayer has waste site and mining classifications which may represent landfills not in the solid waste datalayer.

MANUSCRIPT

The solid waste datalayer was digitized from USGS Quadrangle maps (1:25,000) filed as part of the operating permit (310 CMR 19.00) siting (310 CMR 16.00) requirements for sanitary landfills.

METHODOLOGY

DEP regional office files were searched for quadrangle locus maps which designated the location of solid waste facilities. In some cases the footprint of the facility was located on the map; in other instances a general location was marked on the map. These facilities maps were hand-drawn onto a master set of quadrangle maps from which the datalayer was digitized.

The Division of Solid Waste Management has initiated a program to field check existing facilities using global positioning (GPS). 1:5,000 orthophoto basemaps will also be used for site verification. At the same time, the Division will be using GPS during site inspections to add facilities to the datalayer.

ATTRIBUTES

The following attributes associated with each polygon [bracketed values represent the number of polygons in a classification]:

SL-ID	DSWM Landfill ID#
TR-ID	DSWM Transfer Station ID#
RR-ID	DSWM Recycling Facility ID#
RE-ID	DEP Administrative Region ID
O1-ID	ID number for other facility on a site
O2-ID	ID number for other facility on a site
ACRES	Facility Area in Acres
INSW	Code used for buffer analysis
LINER	Is site lined? (Y/N) [31 Y, 410 N]
DIG-METHOD*	Data Input Method
REGION	DEP Administrative Region [91 CEN, 95 NE, 113 SE, 142 WEST]

DSWM Identification Numbers are assigned according to type of Facility, Town, and Unique Town ID.

The first two characters reflect the type of facility (SW.SL-ID_LUT):

SL	Sanitary Landfill	----------
DL	Demolition Landfill	
SD	Stump Dump	These classifications are included
AL	Ash Landfill	in the items SL-ID, O1-ID, and O2-ID.
EP	Epic (pre-1971)	
IL	Illegal	----------
TR	Transfer Station	
RR	Resource Recovery Facility	
CO	Compost Site	

The first three digits are the facility's TOWN-ID.

The last three digits (after the decimal point) are the unique DSWM identifier.

e.g.
SL-ID = SL001.002 This sanitary landfill is the second DSWM-registered facility in Abington (TOWN-ID 1).
O1-ID = SL001.003 This sanitary landfill is on the same property as SL001.002.

* The three methods of data input are coded as follows in **DIG-METHOD** (SW.DIG-METHOD_LUT):

DIG-METHOD	Description	Number of Polygons
1	Footprint digitized from USGS quadrangle	325
2	Point digitized from USGS quadrangle	115
3	Perimeter points collected with GPS	1

MAINTENANCE

The DEP Division of Solid Waste Management is maintaining this datalayer. Quarterly updates are planned. Questions may be directed to DEP-DSW at (617) 292-5987.

PRICE: $100

Surficial Geology Datalayer
April 1993

OVERVIEW

The MassGIS Project has produced a statewide surficial geology datalayer showing the location sand and gravel deposits. Originally the data was divided into three panels- west, east, and southeast that correspond to the USGS 1:250,000 map sheets that were used as a basemap. This datalayer is very generalized when compared to the other MassGIS data. MassGIS only uses the surficial geology data to produce volume or area measurements over a large region, e.g. a drainage basin. It is not accurate for site specific analysis.

As part of a major data development effort, the datalayer has been greatly enhanced. Now panelled by county boundaries, the data now includes areas of fine-grained deposits and floodplains. For the original southeast panel, the 1:250,000 Providence, RI sheet, large sand deposits have also been delineated. Additionally, contour lines indicating depth of sand and gravel deposits have also been added. The coverages are called **GEO<county number>**.

MANUSCRIPT

This datalayer was interpreted and compiled by Byron Stone, a USGS geologist. A set of USGS 1:250,000 film basemaps were enlarged onto stable based film at a scale of 1:125,000. The data was then recompiled from a set of 1:25,000 quadrangle sheets onto the 1:125,000 basemap. This manuscript does not precisely register with the standard MassGIS basemap.

METHODOLOGY

For the original datalayer production, the tics of the Transverse Mercator manuscripts were projected into the MassGIS State Plane coordinates before digitizing began. Polygons were labeled and a checkplot was made at manuscript scale.

The enhancement, also interpreted and compiled by Byron Stone, was completed in the fall of 1992. With the enlarged maps as basemaps, the fine-grained deposits, floodplains and contours were drafted onto film. All digitizing was completed by MassGIS from these overlays and subsequently, the linework was transformed and projected into state plane coordinates. As with the original manuscripts, these overlays do not precisely register with the MassGIS basemap.

ATTRIBUTES

The **GEO<county number>.PAT** contains the following attributes:

CODE 1 - sand and gravel deposits
2 - till or bedrock
3 - sandy till over sand
4 - end moraines
5 - large sand deposits, where distinguished from sand and gravel deposits
6 - fine-grained deposits
7 - floodplain alluvium
AREA-ACRES
RANGE of depth of deposit, in feet, for code = 1 or 5

EDITING

Plots were made at a scale of 1:125,000 and compared to the original manuscripts. The coverages were clipped to the 1:100,000 coastline.

MAINTENANCE

MassGIS is managing this datalayer.

PRICE: $50. per county.

Datalayers from the 1990 U.S. Census of Population and Housing
April 1993

OVERVIEW

The US Bureau of the Census developed and now distributes the Topologically Integrated Geographic Encoding and Referencing System (TIGER) extract data sets as part of the 1990 Decennial Census. These files are available nationwide and serve as a geographic framework for Census summary statistical and demographic data. EOEA has obtained these files and has reprocessed them into Arc/INFO format and the Massachusetts State Plane Coordinate System to match the existing MassGIS data base.

The Census Bureau developed the "TIGER/Line" geographical database to support its census enumeration and publication programs starting with the 1990 Decennial Census. Linework contained in these files includes the boundary features that the Bureau uses in preparing its data tabulations, including roads, streams, and political boundaries. Much of this linework is comparable to the 1:100,000 scale Digital Line Graphs (DLGs) produced by the U.S. Geological Survey, and in fact DLGs of roads and streams were the source of much of the linework compiled outside of metropolitan areas. Unlike DLGs, the TIGER/Line data includes feature names and, in metropolitan areas, ranges of street addresses. Street name and address attributes facilitate the process of "address-matching" or "geocoding"--linking addresses with geographic coordinates in a GIS.

The TIGER network of lines forms the boundaries of "census block" polygons, the smallest units used by the Census Bureau in tabulating its data. Census blocks are typically the size of city blocks: in fact, they often *are* city blocks, but they can be bounded not only by streets but also by other linear geographic features in the TIGER files including streams and political boundaries. Each of these polygons is assigned a census block number in the TIGER file which is used to reference tabular data published by the Census Bureau.

The tabular data files ("matrices") published by the Census Bureau, *not* the TIGER files themselves, contain the demographic summaries produced as a result of the 1990 Census. However, in the reprocessing of TIGER files for use at MassGIS, a few selected data attributes were extracted from these matrices and incorporated into the MassGIS Census datalayers.

WHAT MASSGIS PROVIDES

As federal digital data products, census data including TIGER files and matrices are available for purchase directly from the Census Bureau in Washington, D.C. Data is also available to the public at forty-one Federal and Census Depository Libraries in Massachusetts, including many university libraries and the Boston Public Library.

MassGIS has extracted and reprocessed data from the original TIGER files for use in its ARC/Info Geographic Information System. The reprocessed Census datalayer has been converted into the Massachusetts State Plane Coordinate system; to minimize processing requirements, the county TIGER files (including the complete set of TIGER linework which comprises *census block* boundaries) have been broken down into separate coverages by town. Census *block group* boundaries have been extracted into separate county coverages for use in processing data at block group resolution. In addition, each town coverage has been prepared for ARC/Info address matching, and a small number of demographic data

items from the Census Bureau's STF-1a and STF-3 publications have been appended to the polygon attribute tables of both the town (*census block*) and county (*block group*) coverages (see the following pages).

Thus, the MassGIS Census datalayer may be convenient for use in an ARC/Info GIS environment, in projects requiring data in the Massachusetts State Plane Coordinate system, or in applications which make use of the specific set of Census Bureau demographic data appended to the MassGIS coverages. In other cases it may be equally effective to obtain the original TIGER files directly from the Census Bureau.

CONSIDERATIONS WHEN USING TIGER DATA

The development of a nationwide, standard 1:100,000 scale geographic data set for the 1990 Census has been hailed as the "backbone" of a federal geographic data infrastructure. The TIGER files are a unique resource, containing a wealth of geographic data attributes unavailable in earlier data sets such as the 1:100,000 scale Digital Line Graphs published by the U.S. Geological Survey. The link between the TIGER files and Census Bureau data--and potentially with data to be published by other federal agencies--makes TIGER data an attractive option for GIS users. Furthermore, the relatively low cost of Census Bureau data and its availability at depository libraries makes TIGER data easily accessable.

As with all sources of GIS data, TIGER data is not suitable for use at a scale larger than it was compiled. In the case of TIGER data this scale is 1:100,000--a regional scale which would not be recommended for use on the larger scale of a Massachusetts town. MassGIS has found the accuracy of TIGER linework to be inconsistent, especially in metropolitan areas where a variety of source maps were used to compile the TIGER files. Another concern for potential users of this data is the size of the TIGER files. As issued by the Census Bureau, county TIGER files are very large and may strain the processing capacities of microcomputers; the smaller town coverages produced by MassGIS may minimize this problem.

TIGER linework frequently does not match the MassGIS "base map" coverages, so care should be exercised when using other MassGIS datalayers together with the Census datalayer for spatial analysis. Due to the large volume of data not every town in the Commonwealth has been checked systematically. The TIGER files contain many errors that were created by the Census Bureau during the production process--for example, legitimate arcs that are smaller than 0.1 feet in length. While these ares have little meaning in a cartographic database, they are part of the TIGER data structure; without them, the relationship between graphics and attributes are degraded or destroyed. In order to maintain this relationship, MassGIS does not intend to edit or make corrections to the TIGER linework.

For more information about TIGER products, contact the U.S. Census Bureau Boston Office at (617) 565-7078. Information about Census data at depository libraries is available from the Boston Public Library, Government Documents Desk at (617) 536-5400 x226.

Town TIGER Geography Datalayer
April 1993

Source

This datalayer was produced from the post-census release of 1990 TIGER/Line files for the fourteen counties of Massachusetts. This datalayer is also known as the *census block* datalayer because it includes the boundaries of all census blocks and can therefore be used in conjunction with Census Bureau data summarized at the census block level--the finest available resolution of census data. To facilitate processing, this datalayer has been broken down from the original county files into town coverages.

Production

The Town (or *census block*) TIGER Geography coverages were created by extracting from county TIGER files all linework, line attributes, and polygon attributes. The coverages were enhanced by dropping redundant data items, appending several demographic data items from the STF-1 and STF-3a census data matrices, and creating an ARC/Info ADD file for address-matching. Each polygon in the original county TIGER file was assigned a MassGIS town-ID code, ensuring that all of the original polygons appear within the Town TIGER Geography datalayer.

In some cases, polygons within the TIGER line network were not assigned unique *census block* numbers by the Census Bureau. That is, more than one polygon was assigned a single census block number, and is thereby related to the same record in the matrices of demographic data published by the Census Bureau. In order to overcome the problem of redundantly assigning data values from the matrices to the TIGER Geography coverages' polygon attribute tables on the basis of these nonunique census block numbers, MassGIS apportioned numeric values among the polygons on the basis of their relative area. This is arguably incorrect, since it assumes demographic heterogeneity among all polygons assigned the same census block number. However, in all cases observed by MassGIS, such polygons were relatively small and contiguous, so the impact of this error is expected to be minimal.

Attributes

The Town TIGER Geography coverages distributed by MassGIS are accompanied by several INFO database files: the PAT (polygon attribute table), AAT (arc attribute table), and ADD (address-matching table). The format of these tables are described below:

Data items (fields) in a PAT file

COL	ITEM NAME	WDTH	OPUT	TYP	N.DEC	Description
1	AREA	8	18	F	5	Area (square feet)
9	PERIMETER	8	18	F	5	Perimeter (feet)
17	TIG-<town-id>#	4	5	B	0	
21	TIG-<town-id>-ID	4	5	B	0	
25	FMCDCCD90	5	5	I	-	Federal (FIPS) Community Code
30	FPLACE90	5	5	I	-	FIPS Place Code
35	MCDCCD90	3	3	I	-	Minor Civil Division
38	TRACT90	6	6	C	-	**1990 Census Tract Number**
38	TRCT_BLK90	10	10	C	-	Concetenated 1990 Tract and Block
38	BLKGROUP	7	7	I	-	Concetenated 1990 Block Group
44	BLOCK90	4	4	C	-	**1990 Census Block Number**
48	COUNTY	3	3	I	-	FIPS County Code (three digits)
51	VTD90	4	4	C	-	
55	TOWN-ID	4	5	B	0	**MassGIS Community Code**
59	FMCDCCD80	5	5	I	-	FIPS Community Code (1980)
64	MCDCCD80	3	3	I	-	Minor Civil Division (1980)
67	TRACT80	6	6	C	-	**1980 Census Tract Number**
73	BLOCK80	3	3	C	-	**1980 Census Block Number**
76	FLAG	1	1	I	-	
77	POPULATION	4	5	B	0	**100% Population Count**
81	DENSITY	8	18	F	5	**Computed Population Density (per square mile)**

Sample record in a PAT

AREA	=	111,367,202.36972
PERIMETER	=	98,125.65395
TIG-20#	=	5
TIG-20-ID	=	3,548
FMCDCCD90	=	3635
FPLACE90	=	0
MCDCCD90	=	5
TRACT90	=	**012200**
BLOCK90	=	**101**
COUNTY	=	1
VTD90	=	0005
TOWN-ID	=	**20**
FMCDCCD80	=	3635
MCDCCD80	=	5
TRACT80	=	
BLOCK80	=	
FLAG	=	0
POPULATION	=	**40**
DENSITY	=	**10.01315**

Data items in an AAT file

COL	ITEM NAME	WDTH	OPUT	TYP	N.DEC	Description
1	FNODE#	4	5	B	0	
5	TNODE#	4	5	B	0	
9	LPOLY#	4	5	B	0	
13	RPOLY#	4	5	B	0	
17	LENGTH	8	18	F	5	Length of the arc (feet)
25	TIG-<town-id>#	4	5	B	0	
29	TIG-<town-id>-ID	4	10	B	0	
33	SOURCE	1	1	C	-	Data Source code
34	FDPRE	2	2	C	-	Feature Direction prefix
36	FNAME	30	30	C	-	Feature name
66	FTYPE	4	4	C	-	Feature type
70	FDSUF	2	2	C	-	Feature Direction suffix
72	CFCC	3	3	C	-	Census Feature Class code
75	FLAG	1	1	I	-	

Sample record from an AAT

FNODE#	=	10262
TNODE#	=	9,935
LPOLY#	=	3
RPOLY#	=	3
LENGTH	=	1,444.57178
TIG-20#	=	17
TIG-20-ID	=	121553246
SOURCE	=	B
FDPRE	=	
FNAME	=	Sandy Neck
FTYPE	=	Road
FDSUF	=	
CFCC	=	A31
FLAG	=	0

Data items in an ADD file

COL	ITEM NAME	WDTH	OPUT	TYP	N.DEC	Description
1	ADDRESS	45	45	C	-	Street address
46	ZONE	15	15	C	-	Special item to account for addresses which appear more than once in a town
61	SIDE	1	1	C	-	Indicates which side(s) of the arc have addresses
62	PARITY	1	1	C	-	Indicates whether address ranges are even, odd, or mixed
63	SOUNDEX	6	6	C	-	Phonetic spelling
69	TIG-<town-id>#	4	5	B	0	
73	TIG-(town-id>-ID	4	5	B	0	

Sample record from an ADD

ADDRESS	=	11	99	ABBEY GATE	RD
ZONE	=				
SIDE	=	L			
PARITY	=	E			
SOUNDEX	=	ABACAA			
TIG-20#	=	7,142			

Fee: $50.00 per Town

MassGIS also maintains on archive tape a County TIGER Geography datalayer which contains the same data as the Town datalayer described here. Because this datalayer is not kept online, requests for this data will be processed from the MassGIS archive tape collection. The large size of these files make their transfer on floppy diskettes unfeasible. This County TIGER Geography datalayer is available at $150.00 per county.

County Block Group Datalayer
April 1993

Source

This datalayer was produced from the post-census release of 1990 TIGER/Line files for the fourteen counties of Massachusetts. This datalayer is known as the *block group* datalayer because it includes the boundaries of census block groups only. This datalayer does not contain the TIGER linework which define *census blocks* and is not suitable for address matching--such data is contained instead in the Town TIGER Geography datalayer. This datalayer is intended for use in conjunction with Census Bureau data summarized at the census block group level, including matricies included in the STF-3a publication.

Production

The County Block Group coverages were created by extracting from county TIGER files all linework which identified boundaries between Census Bureau-defined *block groups*. Block groups are areas which include a variable number of *census blocks* and are used as the summary level for much of the Census Bureau's demographic data. Block groups typically have a population of about 1,000 people. Several demographic data items from the Census Bureau's STF-3a matricies were appended to the polygon attribute tables of these coverages.

Attributes

The polygon attribute table (PAT) files accompanying each Census Block Group coverage contains the following data items (fields):

COL	ITEM NAME	WDTH	OPUT	TYP	N.DEC	Description
1	AREA	8	18	F	5	Area (square feet)
9	PERIMETER	8	18	F	5	Perimeter (feet)
17	TIGBG-ESSE#	4	5	B	0	
21	TIGBG-ESSE-ID	4	5	B	0	
25	TRACT90	6	6	C	-	1990 Census Tract
25	BLKGROUP	7	7	I	-	1990 Census Block Group
32	P	9	9	I	-	Population
41	HU	9	9	I	-	Number of Housing Units
50	INC	9	9	I	-	Median Income (dollars)
59	SOURCE	9	9	I	-	Percentage of HU having an offsite water source (i.e., not a well)
68	SEWER	9	9	I	-	Percentage of HU having offsite sewage disposal (i.e., not a septic system)

Sample record from a PAT

This record shows block group number 2662001, where 216 people live in 100 housing units. Of these housing units, 75% are supplied with water from an outside source (a public or privately-operated water system) and 65% dispose of sewage in an offsite (public or privately-operated) sewage system.

AREA	= 13,994,675.97850
PERIMETER	= 15,924.16749
TIGBG-ESSE#	= 4
TIGBG-ESSE-ID	= 3
TRACT90	= 266200
BLKGROUP	= 2662001
P	= 216
HU	= 100
INC	= 13288
SOURCE	= 75
SEWER	= 65

Fee: $50.00 per County

MAPS FROM MASSGIS

Ordering maps from MassGIS

Maps are most frequently requested output from the MassGIS database. MassGIS has the capabilities to produce maps which depict data as it exists in its database, and also to generate maps which illustrate the spatial relationships between such data. MassGIS produces its maps on demand using its color electrostatic plotter; the office does not have maps on hand available for distribution. This plotter is capable of printing maps as large as 46" x 33.5". MassGIS charges for its maps on a *per page* basis: the cost of a map is *not* dependent on the data reproduced on the map, so the fees listed in the Datalayer descriptions should *not* be applied to map production orders.

The introduction to this *Guide* describes the three categories of maps which can be produced by MassGIS and their prices per page. **Category A** maps include 1:25,000 scale maps of individual towns depicting one of the map "themes" described on the following pages. MassGIS has prepared these map themes to display useful combinations of its environmental data; they are designed to be printed at the 1:25,000 scale seen on USGS 7.5 minute topographic maps and used in the compilation of much of the MassGIS data. Each theme map depicts a single Massachusetts city or town and its surrounding areas, showing a certain set of datalayers from the MassGIS database, and includes a legend and listing of source data.

MassGIS is often asked to reproduce other maps which have been designed for special projects or by other EOEA agencies. Popular examples include the "DEP Natural Resource Maps" covering four regions of Massachusetts, a statewide map of community boundaries, and several other statewide maps showing environmental features. As long as the computer files used to generate such maps remain on the EOEA computer system, MassGIS can reproduce these maps and charge for them under Category A. When ordering such maps, please indicate the map title, date, and name of the responsible agency.

If the map themes described here, or other maps already produced through MassGIS, are not suitable for a specific purpose, MassGIS can add or remove datalayers to generate the desired map. Minor modifications to existing map themes are charged under **Category B**. Maps of areas other than towns, quadrangles, counties, or comparable units are also charged under Category B. (Please note that MassGIS data may not be suitable for display at scales larger than 1:25,000, and that some data may not be displayed clearly at scales smaller than 1:100,000.)

Substantial modifications (requiring more than two hours of staff time) and custom-designed maps are charged under **Category C**.

Beginning October 1, 1993, MassGIS began offering **Site Maps** in support of the Department of Environmental Protection's Numerical Ranking System for Chapter 21E sites. The "DEP MCP NRS" Theme (see below) was designed especially for this purpose. Site maps are 8½" x 11" in size and printed at 1:15,000 scale; they are charged under "Category A."

Map "Themes" Available for Printing

1985 Land Use

Displays in color all twenty-one categories from the 1985 Land Use datalayer and features from the Base Map theme. Data is suitable for use at 1:25,000 scale or smaller; however, at *much* smaller scales, this data may become undistinguishable.

Protected Open Space

Displays Protected and Recreational Open Space parcels compiled by the Open Space Mapping Project (OSMP) with base map features. Parcels are color-coded to indicate by which public or private agency they are owned. (A black-and-white version of this theme is under development.) This theme will display the most recent data verified by OSMP as of the date of printing.

Water Resources

Displays streams and ponds, wetlands (from 1985 Land Use data), Aquifers (high- and medium-yield), Drainage Basin and Sub-Basin boundaries, Public Water Supplies, DEP-approved Zone IIs, interim wellhead protection areas, and base map features. Public Water Supplies and base map features are annotated.

MDC Watershed Protection Act

Displays Protected Open Space, Drainage Basin boundaries, protected buffers around hydrological features, and other data developed in the implementation of the Watershed Protection Act. This map theme has been developed for the MDC watersheds only.

DFA Groundwater Regulations

Displays DEP-approved Zone IIs and interim Wellhead Protection Areas, Public Water Supply wells subject to groundwater protection regulations, and base map features. The Department of Food and Agriculture issues new editions of these maps annually.

Wetlands Habitats

Estimated Habitats of State-listed Rare Wetlands Wildlife. Produced by the Natural Heritage and Endangered Species Program for use with the Wetlands Protection Act Regulations (310 CMR 10.00) only.

DEP MCP (21E) Numerical Ranking System

Displays all environmental data suitable for a Massachusetts Contingency Plan (MCP or Chapter 21E) site assessment as required by the Department of Environmental Protection.

Natural Resources

Displays many categories of environmental data. Available for each of the four DEP regions only.

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to be provided by the Massachusetts Executive Office of Environmental Affairs

MassGIS serves the environmental agencies of the Commonwealth of Massachusetts as a coordinated, statewide database of spatial information for environmental planning and management. Please use this order form to request ***either*** digital data from the MassGIS database (see reverse) ***or one printed map*** to be generated using MassGIS data. The MassGIS *Datalayer Descriptions and Guide to User Services* describes the available map themes and datalayers in detail; to receive a copy please check this box: ☐

Client Information

Organization or Individual			Date
Contact Name			Check or Purchase Order #
Address			Telephone
Town	State	Zip Code	FAX

To Order a Map

1. Choose a Map Theme

____ Land Use	____ DFA Groundwater	____ DEP MCP (21E) NRS Site Map
____ Open Space	____ MDC Watershed	____ Natural Resources (DEP Regions only)
____ Water Resources	____ Wetlands Habitat	

2. Choose a Format Provide the requested information

____ Large Format Map

Map size and scale will vary depending on the area portrayed. Maximum size is 46" x 33". Maps of towns or USGS quadrangles are printed at 1:25,000 scale.

List town, quad, or region name/number

Map Title

____ Site Map

Map will be 8½" x 11" in size and printed at 1:15,000 scale. Radii of 500 feet and ½ mile around the specified coordinates will be shown.

Site Name

Site Address

UTM or LL Coordinates

N E/W

3. Map Production Charges

Basic fee	$ 50.00	
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Additional copies of the same map	____ copies @ $ 25.00	
Extra fee for printing on clear mylar	____ copies @ $ 15.00	
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MassGIS, 20 Somerset Street, Third Floor, Boston, MA 02108 Telephone 617-727-5227

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First provide the client information requested on the reverse side of this form, then use this side to specify which data, format, and media you wish to receive. The MassGIS *Datalayer Descriptions and Guide to User Services* describes available datalayers and panels. Most datalayers divided into panels by town or quadrangle, etc., each priced separately. Please refer to the other side of this form to request a copy of the *Guide*.

1. List Datalayer Names	2. List Panels By number/name for each datalayer	3. Unit Price per panel	4. Data Format Fee see below *	5. Total Price
EXAMPLE Roads Datalayer 1985 Land Use Datalayer	 Quads 5, 11 Town 341	 100.00 100.00	 50.00 25.00	 250.00 125.00
Please attach additional forms if necessary				
TOTAL				

Format and Medium for Digital Data

Format	Media
____ Arc/Info export (circle either: Arc 6 PC Arc)*	____ MS-DOS diskette (circle either: 3.5" 5.25")
____ DXF (AutoCAD)*	____ UNIX Exabyte 8mm tape
____ MapInfo (MIF and MID)*	____ VAX/VMS 9-track tape
____ Other* (specify: _____)	____ Other tape supplied by client (if supported)
* Add $25 per file	

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Signature _____ Date _____

Please return this form with a purchase order or check payable to the **Executive Office of Environmental Affairs**
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Town Numbers and Corresponding Names

1	ABINGTON	78	DOVER	155	LEXINGTON	232	PEPPERELL	309	WARE
2	ACTON	79	DRACUT	156	LEYDEN	233	PERU	310	WAREHAM
3	ACUSHNET	80	DUDLEY	157	LINCOLN	234	PETERSHAM	311	WARREN
4	ADAMS	81	DUNSTABLE	158	LITTLETON	235	PHILLIPSTON	312	WARWICK
5	AGAWAM	82	DUXBURY	159	LONGMEADOW	236	PITTSFIELD	313	WASHINGTON
6	ALFORD	83	EAST BRIDGEWATER	160	LOWELL	237	PLAINFIELD	314	WATERTOWN
7	AMESBURY	84	EAST BROOKFIELD	161	LUDLOW	238	PLAINVILLE	315	WAYLAND
8	AMHERST	85	EAST LONGMEADOW	162	LUNENBURG	239	PLYMOUTH	316	WEBSTER
9	ANDOVER	86	EASTHAM	163	LYNN	240	PLYMPTON	317	WELLESLEY
10	ARLINGTON	87	EASTHAMPTON	164	LYNNFIELD	241	PRINCETON	318	WELLFLEET
11	ASHBURNHAM	88	EASTON	165	MALDEN	242	PROVINCETOWN	319	WENDELL
12	ASHBY	89	EDGARTOWN	166	MANCHESTER	243	QUINCY	320	WENHAM
13	ASHFIELD	90	EGREMONT	167	MANSFIELD	244	RANDOLPH	321	WEST BOYLSTON
14	ASHLAND	91	ERVING	168	MARBLEHEAD	245	RAYNHAM	322	WEST BRIDGEWATER
15	ATHOL	92	ESSEX	169	MARION	246	READING	323	WEST BROOKFIELD
16	ATTLEBORO	93	EVERETT	170	MARLBOROUGH	247	REHOBOTH	324	WEST NEWBURY
17	AUBURN	94	FAIRHAVEN	171	MARSHFIELD	248	REVERE	325	WEST SPRINGFIELD
18	AVON	95	FALL RIVER	172	MASHPEE	249	RICHMOND	326	WEST STOCKBRIDGE
19	AYER	96	FALMOUTH	173	MATTAPOISETT	250	ROCHESTER	327	WEST TISBURY
20	BARNSTABLE	97	FITCHBURG	174	MAYNARD	251	ROCKLAND	328	WESTBOROUGH
21	BARRE	98	FLORIDA	175	MEDFIELD	252	ROCKPORT	329	WESTFIELD
22	BECKET	99	FOXBOROUGH	176	MEDFORD	253	ROWE	330	WESTFORD
23	BEDFORD	100	FRAMINGHAM	177	MEDWAY	254	ROWLEY	331	WESTHAMPTON
24	BELCHERTOWN	101	FRANKLIN	178	MELROSE	255	ROYALSTON	332	WESTMINSTER
25	BELLINGHAM	102	FREETOWN	179	MENDON	256	RUSSELL	333	WESTON
26	BELMONT	103	GARDNER	180	MERRIMAC	257	RUTLAND	334	WESTPORT
27	BERKLEY	104	GAY HEAD	181	METHUEN	258	SALEM	335	WESTWOOD
28	BERLIN	105	GEORGETOWN	182	MIDDLEBOROUGH	259	SALISBURY	336	WEYMOUTH
29	BERNARDSTON	106	GILL	183	MIDDLEFIELD	260	SANDISFIELD	337	WHATELY
30	BEVERLY	107	GLOUCESTER	184	MIDDLETON	261	SANDWICH	338	WHITMAN
31	BILLERICA	108	GOSHEN	185	MILFORD	262	SAUGUS	339	WILBRAHAM
32	BLACKSTONE	109	GOSNOLD	186	MILLBURY	263	SAVOY	340	WILLIAMSBURG
33	BLANDFORD	110	GRAFTON	187	MILLIS	264	SCITUATE	341	WILLIAMSTOWN
34	BOLTON	111	GRANBY	188	MILLVILLE	265	SEEKONK	342	WILMINGTON
35	BOSTON	112	GRANVILLE	189	MILTON	266	SHARON	343	WINCHENDON
36	BOURNE	113	GREAT BARRINGTON	190	MONROE	267	SHEFFIELD	344	WINCHESTER
37	BOXBOROUGH	114	GREENFIELD	191	MONSON	268	SHELBURNE	345	WINDSOR
38	BOXFORD	115	GROTON	192	MONTAGUE	269	SHERBORN	346	WINTHROP
39	BOYLSTON	116	GROVELAND	193	MONTEREY	270	SHIRLEY	347	WOBURN
40	BRAINTREE	117	HADLEY	194	MONTGOMERY	271	SHREWSBURY	348	WORCESTER
41	BREWSTER	118	HALIFAX	195	MOUNT WASHINGTON	272	SHUTESBURY	349	WORTHINGTON
42	BRIDGEWATER	119	HAMILTON	196	NAHANT	273	SOMERSET	350	WRENTHAM
43	BRIMFIELD	120	HAMPDEN	197	NANTUCKET	274	SOMERVILLE	351	YARMOUTH
44	BROCKTON	121	HANCOCK	198	NATICK	275	SOUTH HADLEY		
45	BROOKFIELD	122	HANOVER	199	NEEDHAM	276	SOUTHAMPTON		
46	BROOKLINE	123	HANSON	200	NEW ASHFORD	277	SOUTHBOROUGH		
47	BUCKLAND	124	HARDWICK	201	NEW BEDFORD	278	SOUTHBRIDGE		
48	BURLINGTON	125	HARVARD	202	NEW BRAINTREE	279	SOUTHWICK		
49	CAMBRIDGE	126	HARWICH	203	NEW MARLBOROUGH	280	SPENCER		
50	CANTON	127	HATFIELD	204	NEW SALEM	281	SPRINGFIELD		
51	CARLISLE	128	HAVERHILL	205	NEWBURY	282	STERLING		
52	CARVER	129	HAWLEY	206	NEWBURYPORT	283	STOCKBRIDGE		
53	CHARLEMONT	130	HEATH	207	NEWTON	284	STONEHAM		
54	CHARLTON	131	HINGHAM	208	NORFOLK	285	STOUGHTON		
55	CHATHAM	132	HINSDALE	209	NORTH ADAMS	286	STOW		
56	CHELMSFORD	133	HOLBROOK	210	NORTH ANDOVER	287	STURBRIDGE		
57	CHELSEA	134	HOLDEN	211	NORTH ATTLEBOROUGH	288	SUDBURY		
58	CHESHIRE	135	HOLLAND	212	NORTH BROOKFIELD	289	SUNDERLAND		
59	CHESTER	136	HOLLISTON	213	NORTH READING	290	SUTTON		
60	CHESTERFIELD	137	HOLYOKE	214	NORTHAMPTON	291	SWAMPSCOTT		
61	CHICOPEE	138	HOPEDALE	215	NORTHBOROUGH	292	SWANSEA		
62	CHILMARK	139	HOPKINTON	216	NORTHBRIDGE	293	TAUNTON		
63	CLARKSBURG	140	HUBBARDSTON	217	NORTHFIELD	294	TEMPLETON		
64	CLINTON	141	HUDSON	218	NORTON	295	TEWKSBURY		
65	COHASSET	142	HULL	219	NORWELL	296	TISBURY		
66	COLRAIN	143	HUNTINGTON	220	NORWOOD	297	TOLLAND		
67	CONCORD	144	IPSWICH	221	OAK BLUFFS	298	TOPSFIELD		
68	CONWAY	145	KINGSTON	222	OAKHAM	299	TOWNSEND		
69	CUMMINGTON	146	LAKEVILLE	223	ORANGE	300	TRURO		
70	DALTON	147	LANCASTER	224	ORLEANS	301	TYNGSBOROUGH		
71	DANVERS	148	LANESBOROUGH	225	OTIS	302	TYRINGHAM		
72	DARTMOUTH	149	LAWRENCE	226	OXFORD	303	UPTON		
73	DEDHAM	150	LEE	227	PALMER	304	UXBRIDGE		
74	DEERFIELD	151	LEICESTER	228	PAXTON	305	WAKEFIELD		
75	DENNIS	152	LENOX	229	PEABODY	306	WALES		
76	DIGHTON	153	LEOMINSTER	230	PELHAM	307	WALPOLE		
77	DOUGLAS	154	LEVERETT	231	PEMBROKE	308	WALTHAM		

1:25,000 Topographic Quadrangle Numbers and Corresponding Names

1	CANAAN
2	STATE LINE
3	EGREMONT
4	BASHBISH FALLS
5	BERLIN
6	HANCOCK
7	PITTSFIELD WEST
8	STOCKBRIDGE
9	GREAT BARRINGTON
10	ASHLEY FALLS
11	WILLIAMSTOWN
12	CHESHIRE
13	PITTSFIELD EAST
14	EAST LEE
15	MONTEREY
16	SOUTH SANDISFIELD
17	NORTH ADAMS
18	WINDSOR
19	PERU
20	BECKET
21	OTIS
22	TOLLAND CENTER
23	ROWE
24	PLAINFIELD
25	WORTHINGTON
26	CHESTER
27	BLANDFORD
28	WEST GRANVILLE
29	HEATH
30	ASHFIELD
31	GOSHEN
32	WESTHAMPTON
33	WORONOCO
34	SOUTHWICK
35	COLRAIN
36	SHELBURNE FALLS
37	WILLIAMSBURG
38	EASTHAMPTON
39	MOUNT TOM
40	WEST SPRINGFIELD
41	BERNARDSTON
42	GREENFIELD
43	MT. TOBY
44	MT HOLYOKE
45	SPRINGFIELD NORTH
46	SPRINGFIELD SOUTH
47	NORTHFIELD
48	MILLERS FALLS
49	SHUTESBURY
50	BELCHERTOWN
51	LUDLOW
52	HAMPDEN
53	MT GRACE
54	ORANGE
55	QUABBIN RESERVOIR
56	WINSOR DAM
57	PALMER
58	MONSON
59	ROYALSTON
60	ATHOL
61	PETERSHAM
62	WARE
63	WARREN
64	WALES
65	WINCHENDON
66	TEMPLETON
67	BARRE
68	NORTH BROOKFIELD
69	EAST BROOKFIELD
70	SOUTHBRIDGE
71	ASHBURNHAM
72	GARDNER
73	WACHUSETT MIN
74	PAXTON
75	LEICESTER
76	WEBSTER
77	ASHBY
78	FITCHBURG
79	STERLING
80	WORCESTER NORTH
81	WORCESTER SOUTH
82	OXFORD
83	TOWNSEND
84	SHIRLEY
85	CLINTON
86	SHREWSBURY
87	GRAFTON
88	UXBRIDGE
89	PEPPERELL
90	AYER
91	HUDSON
92	MARLBOROUGH
93	MILFORD
94	BLACKSTONE
95	NASHUA SOUTH
96	WESTFORD
97	MAYNARD
98	FRAMINGHAM
99	HOLLISTON
100	FRANKLIN
101	PAWTUCKET
102	LOWELL
103	BILLERICA
104	CONCORD
105	NATICK
106	MEDFIELD
107	WRENTHAM
108	ATTLEBORO
109	EAST PROVIDENCE
110	BRISTOL
111	SALEM DEPOT
112	LAWRENCE
113	WILMINGTON
114	LEXINGTON
115	NEWTON
116	NORWOOD
117	MANSFIELD
118	NORTON
119	SOMERSET
120	FALL RIVER
121	TIVERTON
122	HAVERHILL
123	SOUTH GROVELAND
124	READING
125	BOSTON NORTH
126	BOSTON SOUTH
127	BLUE HILLS
128	BROCKTON
129	TAUNTON
130	ASSONET
131	FALL RIVER EAST
132	WESTPORT
133	EXETER
134	NEWBURYPORT WEST
135	GEORGETOWN
136	SALEM
137	LYNN
138	HULL
139	WEYMOUTH
140	WHITMAN
141	BRIDGEWATER
142	ASSAWOMPSET POND
143	NEW BEDFORD NORTH
144	NEW BEDFORD SOUTH
145	CUTTYHUNK
146	NEWBURYPORT EAST
147	IPSWICH
148	MARBLEHEAD NORTH
149	MARBLEHEAD SOUTH
150	NANTASKET BEACH
151	COHASSET
152	HANOVER
153	PLYMPTON
154	SNIPATUIT POND
155	MARION
156	SCONTICUT NECK
157	NAUSHON ISLAND
158	SQUIBNOCKET
159	GLOUCESTER
160	SCITUATE
161	DUXBURY
162	PLYMOUTH
163	WAREHAM
164	ONSET
165	WOODS HOLE
166	VINEYARD HAVEN
167	TISBURY GREAT POND
168	ROCKPORT
169	MANOMET
170	SAGAMORE
171	POCASSET
172	FALMOUTH
173	EDGARTOWN
174	SANDWICH
175	COTUIT
176	HYANNIS
177	TUCKERNUCK ISLAND
178	PROVINCETOWN
179	DENNIS
180	NANTUCKET
181	NORTH TRURO
182	WELLFLEET
183	ORLEANS
184	HARWICH
185	CHATHAM
186	MONOMOY POINT
187	GREAT POINT
188	SIASCONSET
189	HAMPTON

1:25,000 Digital Quadrangle Numbers and Corresponding Names

1	CANAAN
2	STATE LINE
3	EGREMONT
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5	BERLIN
6	HANCOCK
7	PITTSFIELD WEST
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9	GREAT BARRINGTON
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11	WILLIAMSTOWN
12	CHESHIRE
13	PITTSFIELD EAST
14	EAST LEE
15	MONTEREY
16	SOUTH SANDISFIELD
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111	SALEM DEPOT
112	LAWRENCE
113	WILMINGTON
114	LEXINGTON
115	NEWTON
116	NORWOOD
117	MANSFIELD
118	NORTON
119	SOMERSET
120	FALL RIVER
121-S	TIVERTON SOUTH
121	TIVERTON
122	HAVERHILL
123	SOUTH GROVELAND
124	READING
125	BOSTON NORTH
126	BOSTON SOUTH
127	BLUE HILLS
128	BROCKTON
129	TAUNTON
130	ASSONET
131	FALL RIVER EAST
132-S	WESTPORT SOUTH
132	WESTPORT
133	EXETER
134	NEWBURYPORT WEST
135	GEORGETOWN
136	SALEM
137	LYNN
138	HULL
139	WEYMOUTH
140	WHITMAN
141	BRIDGEWATER
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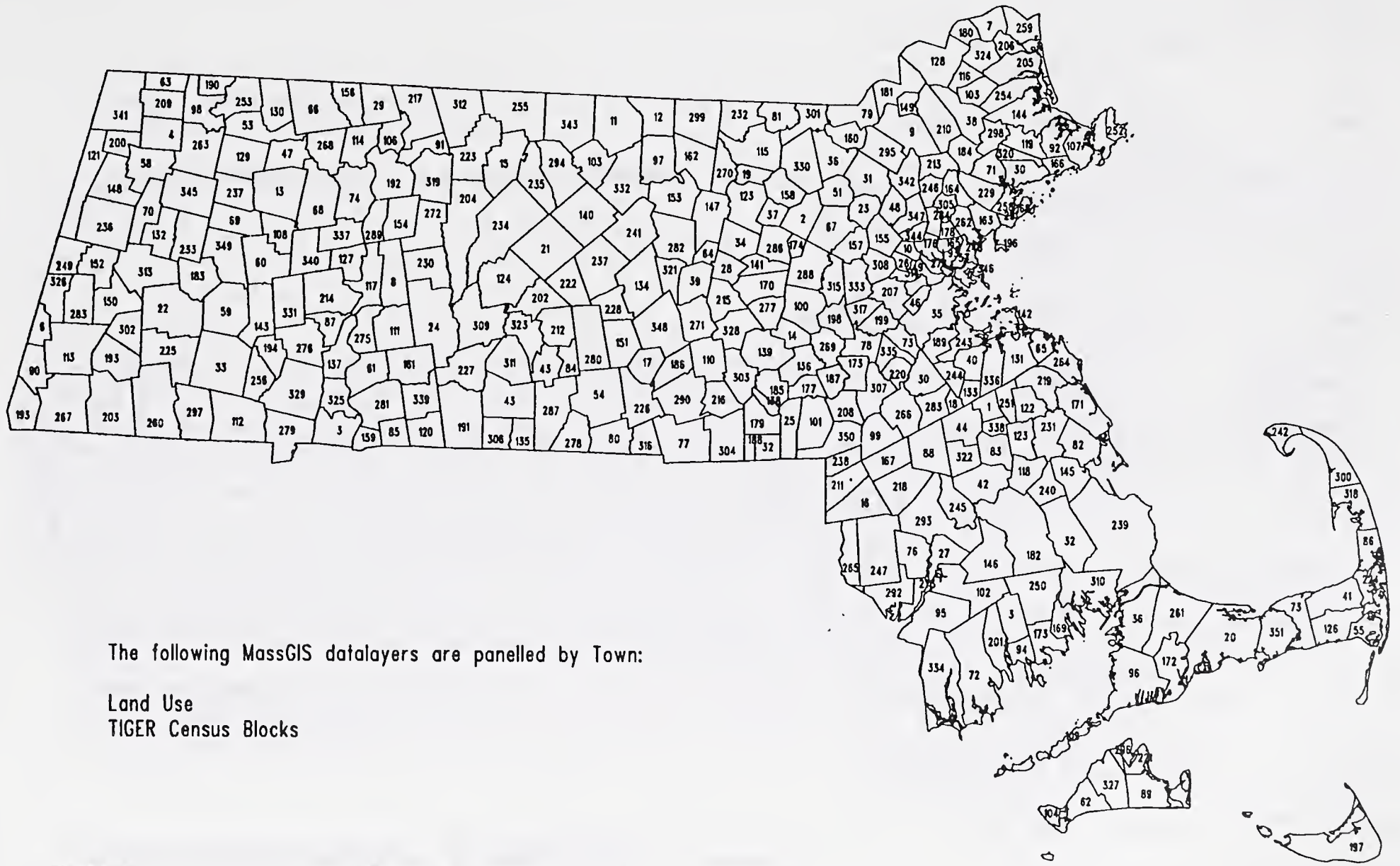
150	NANTASKET BEACH
151	COHASSET
152	HANOVER
153	PLYMPTON
154	SNIPATUIT POND
155	MARION
156	SCONTICUT NECK
157	NAUSHON ISLAND
158	SQUIBNOCKET
158-S	SQUIBNOCKET SOUTH
159-W	GLOUCESTER WEST
159-E	GLOUCESTER EAST
160	SCITUATE
161	DUXBURY
161-E	DUXBURY EAST
162	PLYMOUTH
163	WAREHAM
164	ONSET
165	WOODS HOLE
166	VINEYARD HAVEN
167	TISBURY GREAT POND
168-E	ROCKPORT EAST
168-W	ROCKPORT WEST
169	MANOMET
170	SAGAMORE
171	POCASSET
172	FALMOUTH
173-SE	EDGARTOWN-SE
173	EDGARTOWN
173-S	EDGARTOWN SOUTH
173-E	EDGARTOWN EAST
174-N	SANDWICH NORTH
174	SANDWICH
175	COTUIT
176-S	HYANNIS SOUTH
176	HYANNIS
177	TUCKERNUCK ISLAND
178	PROVINCETOWN
179	DENNIS
179-N	DENNIS NORTH
180-S	NANTUCKET SOUTH
180	NANTUCKET
181	NORTH TRURO
182	WELLFLEET
182-E	WELLFLEET EAST
183	ORLEANS
184	HARWICH
184-N	HARWICH NORTH
185	CHATHAM
186	MONOMOY POINT
186-W	MONOMOY POINT WEST
187-E	GREAT POINT EAST
187	GREAT POINT
188-E	SIASCONSET EAST
188	SIASCONSET
188-S	SIASCONSET SOUTH
188-SE	SIASCONSET SE
189	HAMPTON

TOWN PANELS

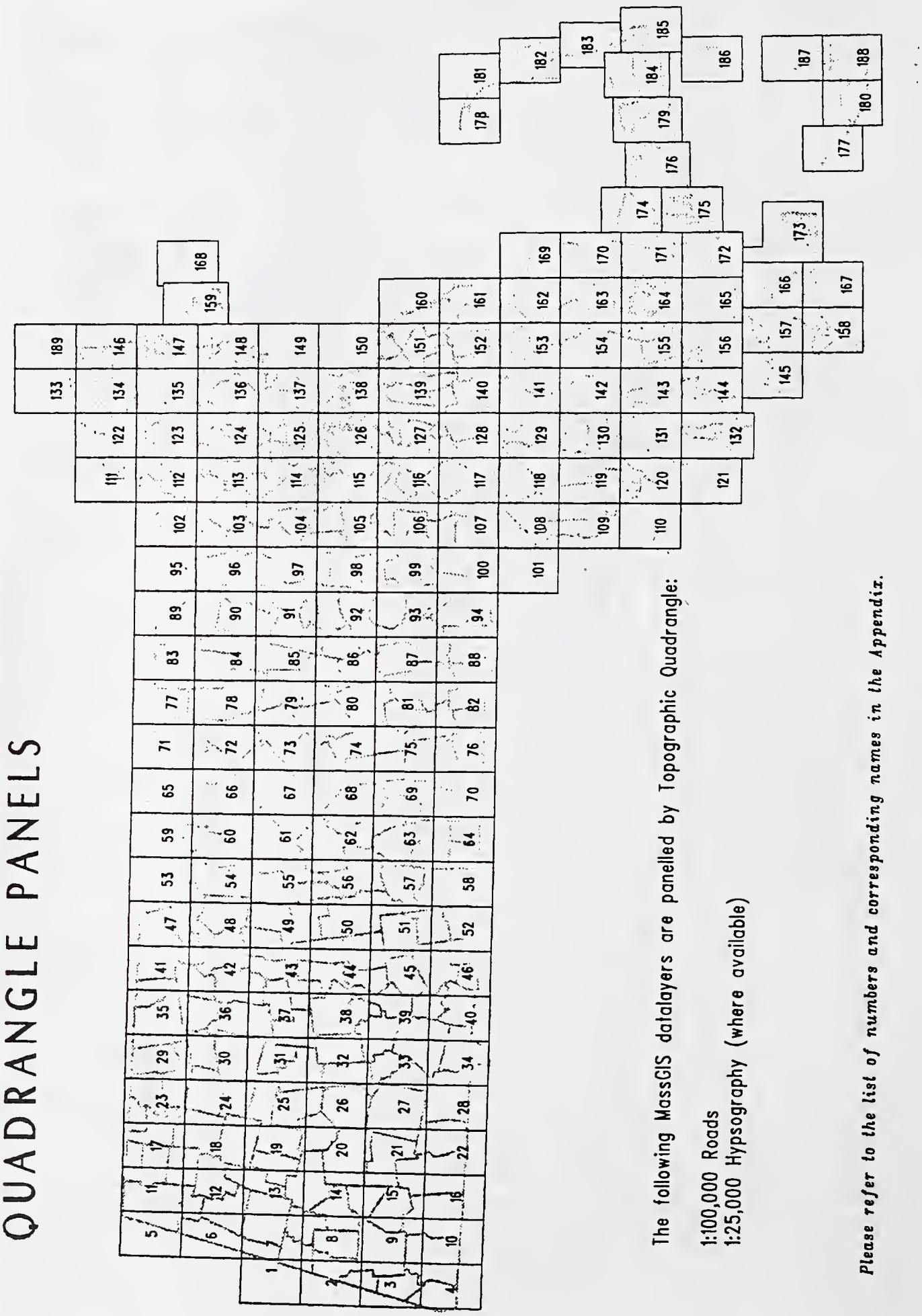


The following MassGIS datalayers are panelled by Town:

Land Use
TIGER Census Blocks

Please refer to the list of numbers and corresponding names in the Appendix.

QUADRANGLE PANELS

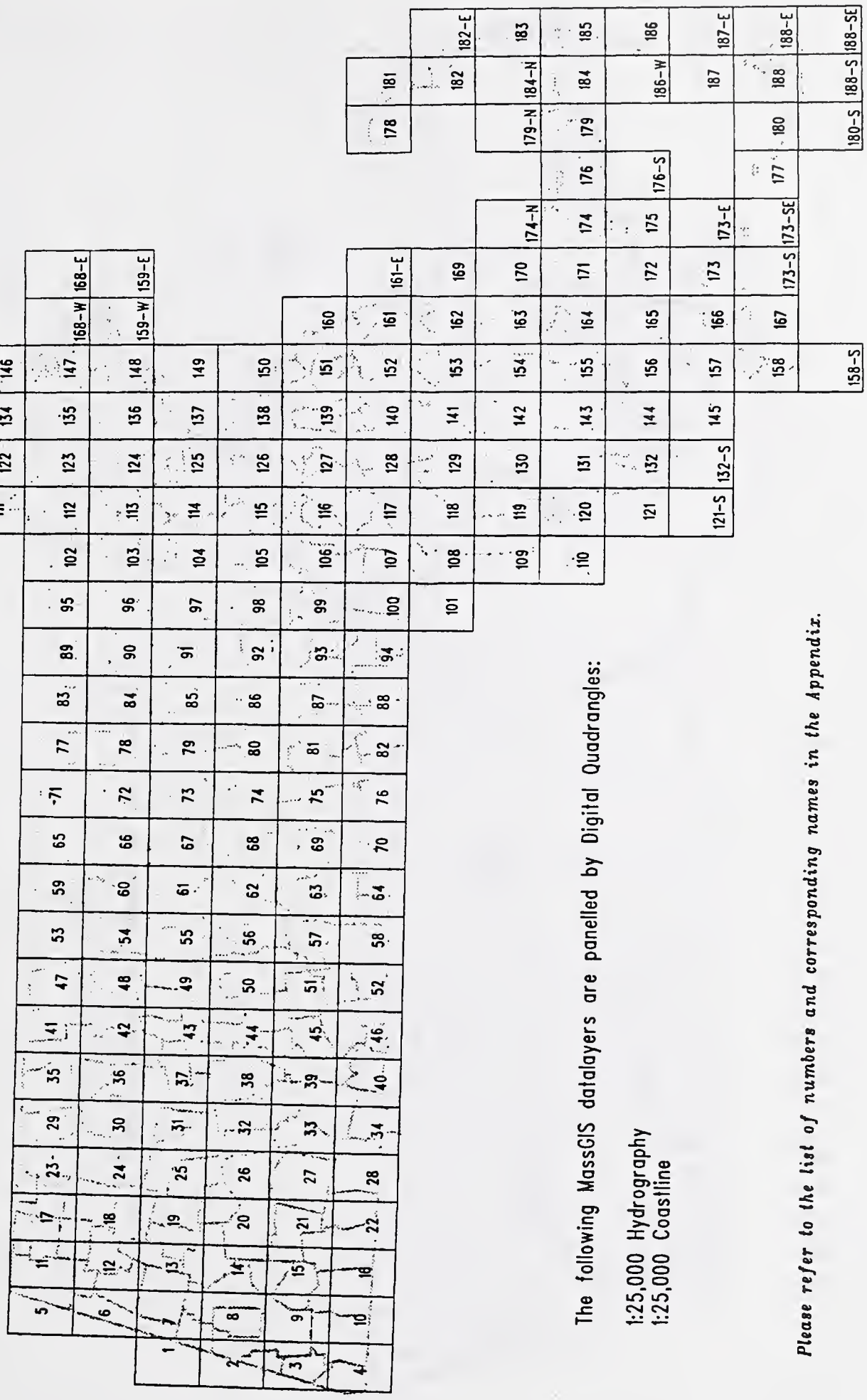


The following MassGIS datalayers are panelled by Topographic Quadrangle:

1:100,000 Roads
1:25,000 Hypsography (where available)

Please refer to the list of numbers and corresponding names in the Appendix.

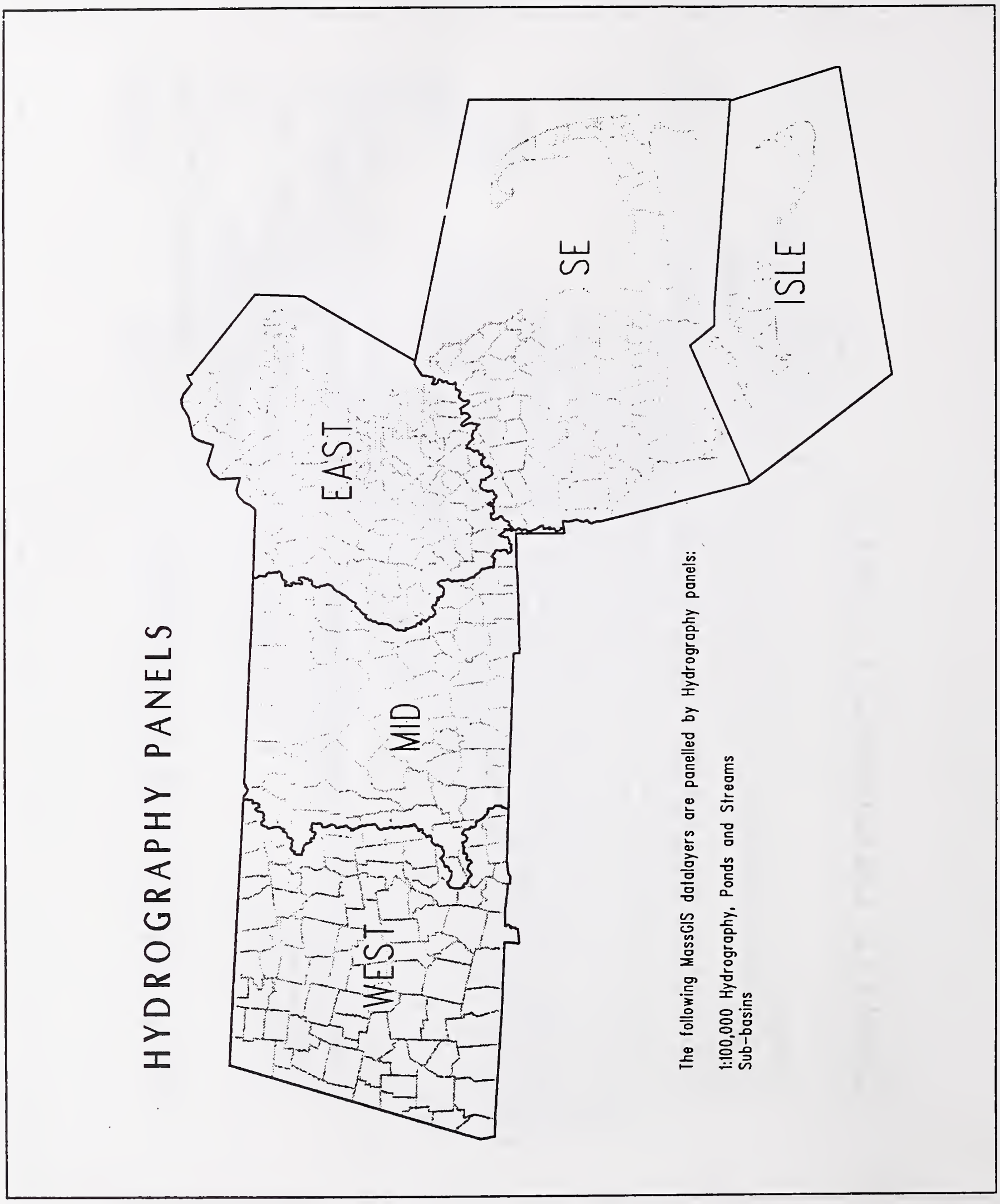
DIGITAL QUADRANGLE PANELS



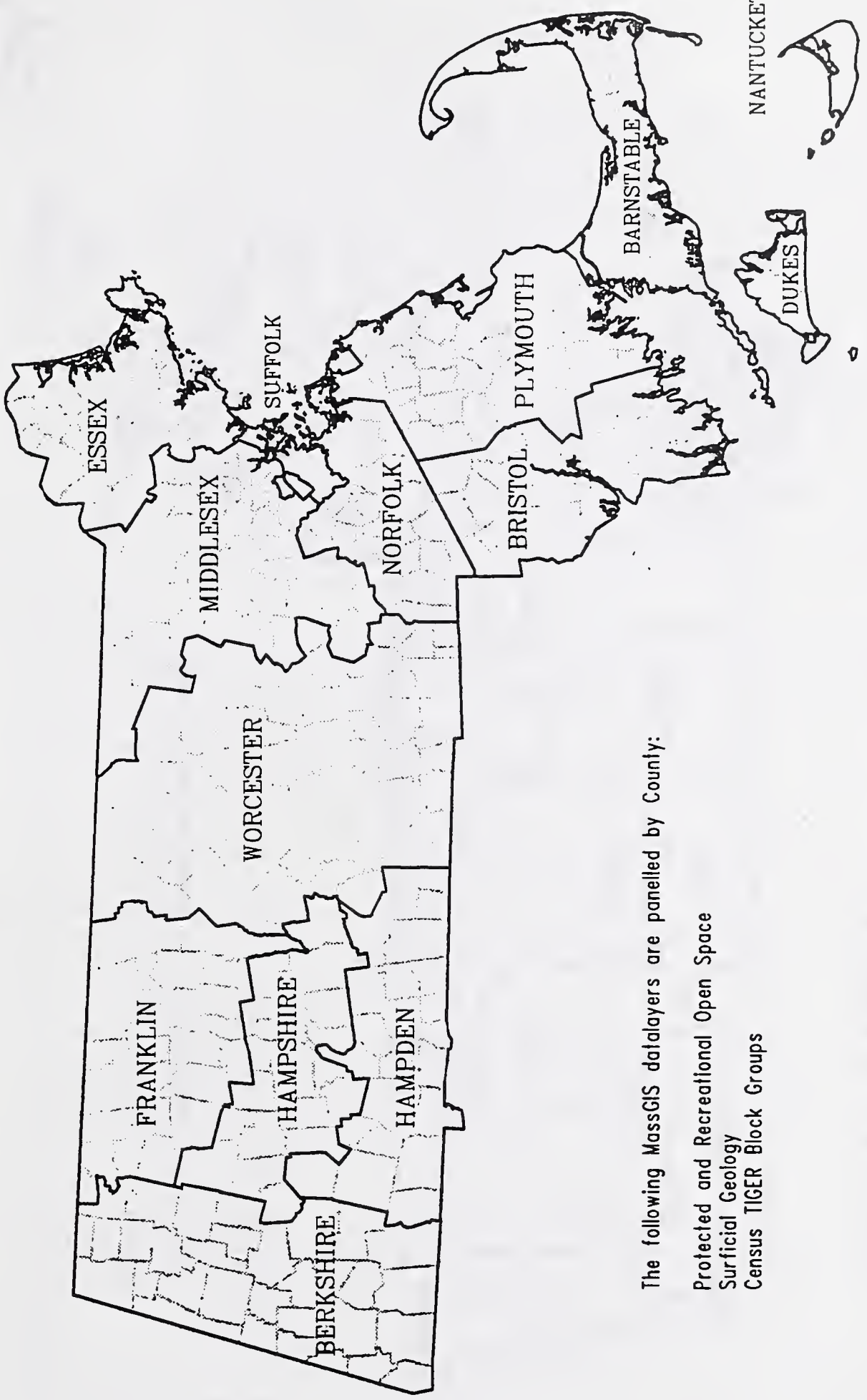
The following MassGIS datalayers are panelled by Digital Quadrangles:

1:25,000 Hydrography
1:25,000 Coastline

Please refer to the list of numbers and corresponding names in the Appendix.


HYDROGRAPHY PANELS
WEST
MID
EAST
SE
ISLE
The following MassGIS datalayers are panelled by Hydrography panels:
1:100,000 Hydrography, Ponds and Streams
Sub-basins

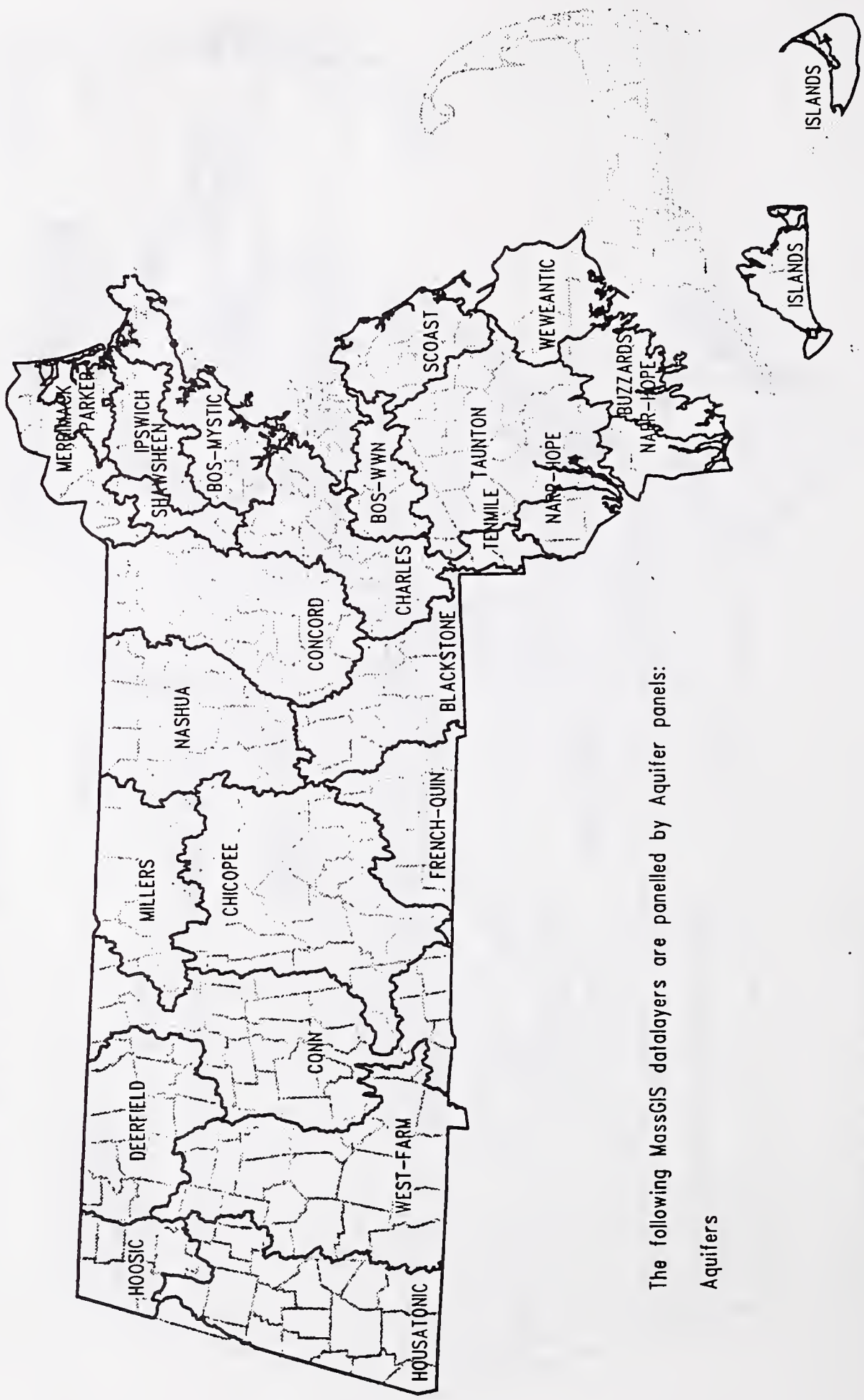
COUNTY PANELS



The following MassGIS datalayers are panelled by County:

Protected and Recreational Open Space
Surficial Geology
Census TIGER Block Groups

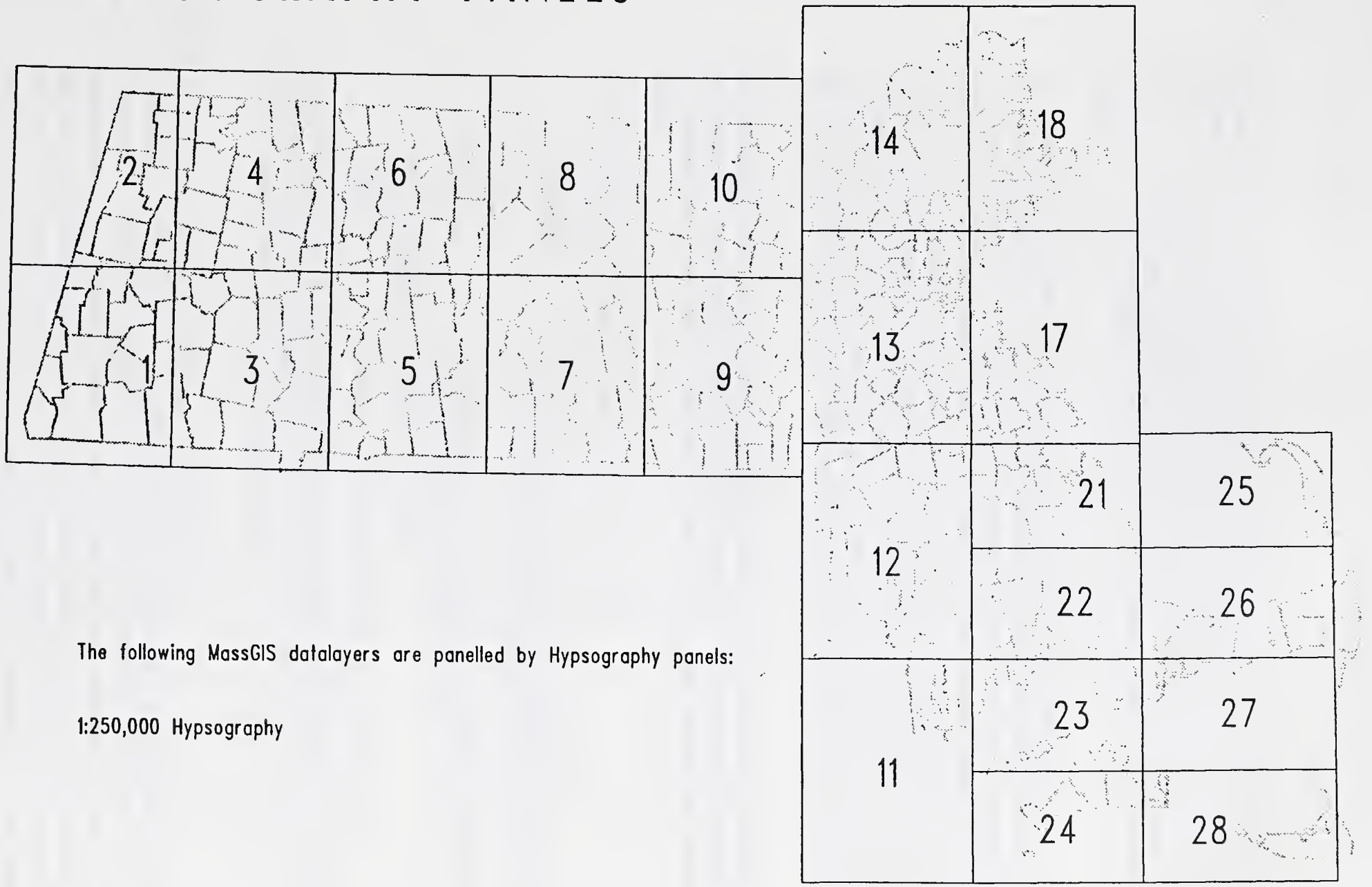
AQUIFER PANELS



The following MassGIS datalayers are panelled by Aquifer p

Aquifers

HYPSOGRAPHY PANELS



The following MassGIS datalayers are panelled by Hypsography panels:

1:250,000 Hypsography

Protected and Recreational Open Space Datalayer
April 1993

OVERVIEW

The protected and recreational open space datalayer contains the parcels boundaries of conservation lands *and* recreational facilities in Massachusetts. The associated database contains a wealth of information about each parcel, including ownership, level of protection, public accessibility, and activities occurring at each site. Federal, state, county, municipal, nonprofit and privately owned conservation and recreation facilities are all included in this datalayer.

The datalayer is panelled into 14 county coverages and is undergoing significant updates in 1993. This update effort, coordinated by MassGIS, involves over 150 volunteers from state environmental agencies, local watershed associations, town conservation commissions, municipal planning and engineering departments, local and regional nonprofits, and many others. The most significant change from our previous open space datalayer is the addition of municipal conservation lands and recreational facilities. This datalayer is being completely integrated with the 1994 update of the Statewide Comprehensive Outdoor Recreation Plan (SCORP) inventory. All attribute data will eventually be maintained in an ORACLE database, linked to the GIS coverages through a unique identifier called the OS_ID.

This datalayer is currently under development and as such is constantly changing. It is not expected to reach a final production stage until 1994. However, it is available for use in a limited way. Attributes, while comprehensive in scope, are incomplete for many parcels.

The following types of land are included in this datalayer:

conservation land	-	habitat protection with minimal recreation, such as walking trails
recreation land	-	outdoor facilities such as town parks, commons, playing fields, school fields, golf courses, bike paths, scout camps, and fish and game clubs; and indoor recreational facilities, such as swimming pools. These may be privately or publicly owned facilities.
town forests		
parkways	-	green buffers along roads, as long as they are a recognized conservation resource)
agricultural land	-	land protected under an Agricultural Preservation Restriction (APR) and administered by the state Department of Food and Agriculture (DFA)
aquifer protection land	-	not zoning overlay districts
watershed protection land	-	not zoning overlay districts
fire districts		
cemeteries	-	as long as they are a recognized conservation or recreation resource

Also included as an option are Chapter 61 type lands (61 = Forestry; 61A = Agriculture; 61B = Recreation). These parcel boundaries will *not* be maintained over time but are useful to some towns for future planning purposes.

ORIGINAL SOURCE MANUSCRIPTS and ORIGINAL PRODUCTION

State and federal lands were originally compiled in 1988 from 1:25,000 scale maps by the Department of Regional Planning and Landscape Architecture at the University of Massachusetts at Amherst. The data were verified and are maintained by each of the agencies of the Executive Office of Environmental Affairs (EOEA). Each agency maintains its own maps according to its own standard operating procedures and the accuracy of these maps varies. Some of the parcels were drafted onto USGS quadrangles from detailed surveys, while in other cases the exact property boundary is not known. The compilation

process that produced a unified manuscript faithfully reproduced the property boundaries as represented on the agencies' maps. The DFWELE cartographer then compiled onto this manuscript the land holdings of the National Park Service (NPS), US Fish & Wildlife Service (USFWS), and The Trustees of Reservations (TTOR, incomplete). Updating of this coverage began in the fall of 1989 and is ongoing.

Also included in the original open space datalayer were some community and local lands within Berkshire and Essex Counties and the Nashua River Basin. The production methodology varied subtly by region. Compilation of open space holdings in Essex County had already been done by the Essex County Greenbelt Association (ECGA), and these 1:25,000 scale maps were used as the manuscript for Essex County. Manuscripts for Berkshire County were compiled by the Berkshire County Cooperative Extension Service in cooperation with town assessors, conservation commissions, and local land trusts. Manuscripts for the Nashua River Basin were prepared jointly by DFWELE and the Department of Food and Agriculture (DFA) from town assessors maps.

CURRENT SOURCE MANUSCRIPTS and PRODUCTION METHODOLOGY

The open space datalayer is now divided into 14 county panels. All of the existing information (both geographic and attribute) was maintained in the new panelling scheme and is now being enhanced with the assistance of volunteers at the local level. The resulting data are variable in their accuracy and completeness. Geographic data sources are predominantly town tax assessors maps and existing open space plans. We are maintaining a record of all source maps used. In the majority of cases these maps have been recompiled by the volunteers onto a standard 1:25,000 basemap produced by MassGIS. The data are then digitized from these basemaps. In a very few cases data may be digitized from the volunteer's own map if it meets minimum digitizing requirements. Occasionally data are also pulled into the coverage from pre-existing digital datalayers provided by a town, RPA, or state agency. All polygons bordering a road, stream, pond, town boundary, or coastline are snapped to that feature and the coincident arcs are coded according to the coincident feature.

NOTE ON APPROPRIATE USE OF DATA:
These data are very useful for most statewide and regional planning purposes. However, they are <u>not</u> a legal record of ownership, and the user should understand that the parcel representations are generally not based on property surveys.

ATTRIBUTES

Currently all attribute information is maintained in Arc/Info in a PAT. Migration of these data to ORACLE is scheduled for 1994. At that time the GIS attribute data will be merged with the updated SCORP data and in many cases there will be additional information available for each polygon, including the level of public access to a site (including transportation options), and the types of facilities and activities at each site. Enhancements to the attribute database also include historical tracking of source manuscripts as changes are made to existing polygons, and the ability to track multiple ownerships, other legal interests, management interests and funding interests related to a single polygon.

DATAFILE NAME: OS-<COUNTY>.PAT
45 ITEMS: STARTING IN POSITION 1

COL	ITEM NAME	WDTH	OPUT	TYP	N.DEC	CONTENTS
1	AREA	4	12	F	3	
5	PERIMETER	4	12	F	3	
9	OS-<COUNTY>#	4	5	B	0	
13	OS-<COUNTY>-ID	4	5	B	0	
17	OLD-OS-ID	4	5	B	0	For 1988 OS compilation
21	COUNTY_CODE	2	2	I	-	
23	POLY-ID	5	5	I	-	unique value within each county
28	SCORP_ID	6	6	I	-	link to 1987 SCORP data
34	FEE_OWNER	20	20	C	-	
54	STATUS_FEE_OWNER	1	1	C	-	
55	MANAGER	20	20	C	-	
75	INT_MANAGER	4	4	C	-	
79	STATUS_MANAGER	1	1	C	-	
80	OTHER_1	20	20	C	-	Other legal interests
100	INT_1	4	4	C	-	"
104	STATUS_1	1	1	C	-	"
105	OTHER_2	20	20	C	-	"
125	INT_2	4	4	C	-	"
129	STATUS_2	1	1	C	-	"
130	OTHER_3	20	20	C	-	"
150	INT_3	4	4	C	-	"
154	STATUS_3	1	1	C	-	"
155	SITE_NAME	30	30	C	-	
185	SRC_MAP_REF	4	4	I	-	Table with source map attributes
189	AREA_ACRES	9	9	N	2	Calc. by GIS
198	ASSESS_ACRES	9	9	N	2	Calc. by tax assessor
207	DEED_ACRES	9	9	N	2	
216	FY_FUNDING	4	4	I	-	state properties only
220	CAL_YR_REC	4	4	I	-	all properties
224	PRIMARY_PURP	1	1	C	-	primary purpose
225	PUB_ACCESS	1	1	C	-	public access
226	LEV_PROT	1	1	C	-	level of protection
227	OS_DEED_BOOK	4	4	I	-	
231	OS_DEED_PAGE	4	4	I	-	
235	TOWN-ID	3	3	I	-	
238	ASSESS_MAP	5	5	C	-	Assessors' map information
243	ASSESS_BLK	5	5	C	-	"
248	ASSESS_LOT	5	5	C	-	"
253	ASSESS_SUBLOT	5	5	C	-	"
258	COMMENTS	60	60	C	-	
318	UPDATES	1	1	C	-	
319	CH61	1	1	C	-	
320	CH61A	1	1	C	-	
321	CH61B	1	1	C	-	
322	DFWFLAG	2	2	C	-	
324	POLY-DATE	8	8	D	-	Date polygon altered
332	ATT-DATE	8	8	D	-	Date attributes altered
** REDEFINED ITEMS **						
21	OS_ID	7	8	I	-	Unique GIS identifier; link to 1993 SCORP

See next page for various coding types.

DATALAYER MAINTENANCE

MassGIS is maintaining this datalayer. Any updates or corrections sent to MassGIS will be incorporated into the datalayer. Please refer to the OS_ID when informing us of incorrect data. Anyone wishing to volunteer to gather information for their town for inclusion in this datalayer should also contact MassGIS.

PRICE: $50 per County

CODE DESCRIPTIONS FOR OPEN SPACE

(Within each section all codes are applicable to all fields)

1. STATUS FIELDS

Field:	Code:	Description:
STATUS_OWNER (SFO)	F	Federal
STATUS_MANAGER	S	State
STATUS_1	C	County
STATUS_2	M	Municipal
STATUS_3	N	Private Nonprofit
	P	Private for profit
	B	Public Nonprofit
	O	None of the above - explain in the comments section of the worksheet and the comments item of the PAT.
	X	Unknown
	I	Inholding (a piece of unprotected property surrounded on all sides by a protected property or a recreational facility)

2. INTEREST FIELDS

Field:	Code:	Description:
		Restrictions:
INT_MANAGER	CR	Conservation Restriction
INT_1	APR	Agricultural Preservation
INT_2	AQR	Aquifer Protection
INT_3	AR	Air Rights
	HPR	Historic Preservation
	SE	Scenic easement (official restriction only)
	WR	Watershed Restriction (local)
	WRP	Wetlands Restriction (Program)
		Funding Sources:
		State programs:
	ALA	Aquifer Lands Aquisition
	SH	State Self-help
	USH	Urban Self-help
	CTC	City and Town Commons
	APR	Agricultural Preservation
		Federal programs:
	LWCF	Land and Water Conservation Fund
	FF	Other federal funds

3. PUBLIC ACCESS TYPES

Field:	Code:	Description:
PUB_ACCESS (PA)	Y	Yes (open to public)
	N	No (not open to public)
	L	Limited (membership only)
	X	Unknown
	1	Public
	2	Public (residents only)
	3	Public (seasonal)
	4	Private (public welcome)
	5	Private (members only)
	6	None

4. PRIMARY PURPOSE

Field:	Code:	Description:
PRIMARY_PURP (PP)	R	Recreation (activities are facility based)
	C	Conservation (activities are non-facility based)
	B	Recreation and Conservation
	H	Historical/Cultural
	A	Agriculture

	W	Water Supply Protection
	S	Scenic (official designation only)
	O	Other (explain)
	X	Unknown

5. LEVEL OF PROTECTION

Field:	Code:	Description:
LEV_PROT (LP)	P	In perpetuity
	T	Temporary
	L	Limited (by something other than time)
	N	None
	X	Unknown

6. CHAPTER 61 TYPE

Field:	Code:	Description:
CH61 (Forestry)	Y	Yes
CH61A (Agriculture)	Y	Yes
CH61B (Recreation)	Y	Yes

7. OWNERSHIP ABBREVIATIONS

Field:	Code:	Description:
	eg.	
FEE_OWNER (FO)	M<townid>SD	= Town of <townid> school department
MANAGER	eg. M004SD	= Town of Adams school department
OTHER_1	MGLT	= Mount Grace Land Trust
OTHER_2		
OTHER_3		

ARC CODES

Field:	Code:	Description
CODE	0	Not coincident
	1	Town boundary
	2	Road
	3	Stream
	4	Pond or lake shore
	5	Coastline
	6	Train line
	9	Not sure if feature is coincident